Second Revision No. 36-NFPA 20-2020 [Detail]

ADD NEW SECTION:

14.2.6.6.11 Automatic Activation Test.

14.2.6.6.11.1

For water mist positive displacement pumping units, the automatic activation test shall be carried out by using a test connection that simulates the smallest system nozzle, in the hydraulically most remote area, discharged from maintenance pressure/standby pressure or equal-sized test orifice in the pump unit test line.

14.2.6.6.11.2

The pumping unit shall achieve the system design discharge pressure within the time specified in 8.4.9.

Submitter Information Verification

Committee:

Submittal Date: Tue Oct 27 16:21:46 EDT 2020

Committee Statement

Committee Statement: The time required to achieve the system design discharge pressure needs to be evaluated as part of the listing and described in the manufacturer's design manual. The use of general requirements are not appropriate and needs to be identified during fire testing. Maintains consistency with 8.4.9.

Response Message: SR-36-NFPA 20-2020

Public Comment No. 16-NFPA 20-2020 [New Section after 14.2.6.6.3.10]

Second Revision No. 64-NFPA 20-2020 [Detail]

Add new section:

11.4.1.3.1.1

When the fuel supply rate requirements of the engine are not known, fuel supply tank(s) shall have a capacity at least equal to 1 gal per hp (5.07 L per kW), plus 5 percent volume for expansion and 5 percent volume for sump.

Submitter Information Verification

Committee:

Submittal Date: Thu Nov 05 16:03:02 EST 2020

Committee Statement

Committee Statement: Section 11.4.1.3.1 has been updated to require 12 hours of engine run time as opposed to 8 hours. The new section 11.4.1.3.1.1 is added to ensure that, if fuel consumption rates of the engine is unknown, the tank should be sized per the 1 gallons per HP requirement as currently in standard.

Response Message: SR-64-NFPA 20-2020

Public Comment No. 49-NFPA 20-2020 [New Section after 11.4.1.3.1]

Second Revision No. 65-NFPA 20-2020 [Section No. 2.4]

2.4 References for Extracts in Mandatory Sections.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems,* 2019 edition.

NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines,* 2018 edition.

NFPA 70®, National Electrical Code®, 2020 edition.

NFPA 110, *Standard for Emergency and Standby Power Systems,* 2019 edition.

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program,* 2018 edition.

NFPA 5000®, Building Construction and Safety Code®, ~~2018~~ 2021 edition.

Submitter Information Verification

Committee: FIM-AAA
Submittal Date: Thu Nov 19 10:30:58 EST 2020

Committee Statement

Committee Statement: Edition Update
Response Message: SR-65-NFPA 20-2020

Second Revision No. 42-NFPA 20-2020 [Section No. 3.3.2]

~~**3.3.2** Adjustable Speed Drive (ASD).~~

~~Power conversion equipment that provides a means of adjusting the speed of an electric motor. [**70:** 100]~~

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:15:26 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. The definition of adjustable speed drive is deleted as per this decision.

Response Message: SR-42-NFPA 20-2020

Second Revision No. 4-NFPA 20-2020 [Section No. 3.3.14]

3.3.13 Corrosion-Resistant Material.

Materials such as brass, copper, ~~Monel~~ ® , stainless steel, or other ~~equivalent corrosion-resistant~~ materials that withstand corrosion damage caused by oxidation or other chemical reactions .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 19:40:36 EDT 2020

Committee Statement

Committee Statement: There is no reason to specify metallic vs non-metallic material as long as it is corrosion resistant.

Response Message: SR-4-NFPA 20-2020

Public Comment No. 40-NFPA 20-2020 [Section No. 3.3.14]

Second Revision No. 6-NFPA 20-2020 [New Section after 4.6.2.1]

4.6.2.1.1*

Where mechanical seals are used as fire pump shaft seals, water supplied to the pump shall be from one of the following:

(1) Public service main

(2) Clean water stored in a closed top tank

(3) Other water supplies having a water quality that meets the pump manufacturer's specifications

A.4.6.2.1.1

Fire pumps with mechanical seals should be restricted to those applications where only clean water is pumped. Debris and particles can adversely affect the performance of mechanical seals and cause the seal to fail its intended function. Water supplies should not be from a source, such as open tanks and open bodies of water (e.g., retention ponds, lakes, or rivers), that allows for particles, such as sand and debris, to enter the water. Also, the pump should operate with positive pressure conditions at the pump inlet at all times.

4.6.2.1.2

Clean water flush for mechanical seats shall be of positive pressure.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 20:12:01 EDT 2020

Committee Statement

Committee Statement: Not all pumps (such as a Vertical Turbine type pumps) have positive pressure all the time. Seal flush water must be clean and of positive pressure.

Response Message: SR-6-NFPA 20-2020

Public Comment No. 4-NFPA 20-2020 [New Section after 4.6.2.1]

Second Revision No. 43-NFPA 20-2020 [Section No. 4.8.7]

4.8.7

The output current rating of the ~~adjustable speed drive (ASD)~~ variable frequency drive (VFD) as marked on the nameplate of the controller shall not be exceeded when operating the motor at the maximum pump horsepower in accordance with 4.11.3.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:18:43 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-43-NFPA 20-2020

Second Revision No. 2-NFPA 20-2020 [Section No. 4.14.1.3]

4.14.1.3 Fire Pump Buildings or Rooms with Diesel Engines.

Fire pump buildings or rooms enclosing diesel engine pump drivers and ~~day~~ fuel tanks shall be protected with an automatic sprinkler system installed in accordance with NFPA 13 as an Extra Hazard Group 2 occupancy.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 13:20:12 EDT 2020

Committee Statement

Committee Statement: The committee does not approve the use of a day tank and provides specific guidance on fuel tank installations in chapter 11. The committee decided to revise "day tank" to "fuel tank" as an editorial correction.

Response Message: SR-2-NFPA 20-2020

Second Revision No. 10-NFPA 20-2020 [Section No. 4.20.6.2.1]

4.20.6.1.1

If the pipe employs more than one elbow, the next larger pipe size shall be used.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 21:56:23 EDT 2020

Committee Statement

Committee Statement: The requirement to increase the pipe size if more than one elbow is used, only applies when using table 4.28(a) and 4.28(b). The committee relocated section 4.20.6.2.1 to 4.20.6.1.1 to clarify this requirement. If the pipe is already hydraulically sized then it doesn't need to be increased to the next pipe size.

Response Message: SR-10-NFPA 20-2020

Public Comment No. 46-NFPA 20-2020 [Section No. 4.20.6]

Second Revision No. 54-NFPA 20-2020 [Section No. 4.21.1.2.1]

4.21.1.2.1

The discharge pressure shall ~~be permitted to~~ restabilize within 20 seconds whenever the flow condition changes.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 21:21:49 EDT 2020

Committee Statement

Committee Statement: Not having a time limit specified for discharge pressure to “re-stabilize” would potentially allow for the discharge pressure to be below the required pressure for a long period of time. The added 20 seconds provides a time limit for pressure stabilization to make the section enforceable. The change correlates with FR 64.

Response Message: SR-54-NFPA 20-2020

Second Revision No. 7-NFPA 20-2020 [Section No. 4.35.1]

4.35.1* Automated Inspection and Testing .

4.35.1.1

Devices, meters, and equipment utilized to perform automated inspection and testing procedures that are subjected to system pressure, where provided, shall be listed.

4.35.1.2

Components that are subjected to system pressure but do not affect the fire pump's performance shall not be required to be listed.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 20:39:31 EDT 2020

Committee Statement

Committee Statement: The current title doesn't reflect the total scope of this section. Adding "Testing" to the title assists the user when looking for these requirements.

Response Message: SR-7-NFPA 20-2020

Public Comment No. 25-NFPA 20-2020 [Section No. 4.35.1]

Second Revision No. 22-NFPA 20-2020 [Section No. 8.4.2]

8.4.2

Except as provided in 8.4.3 through ~~8.4.8~~ 8.4.11 , all the requirements of this standard shall apply.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 11:04:50 EDT 2020

Committee Statement

Committee Statement: Update section in line with updated 8.4 subsections where the committee decided that all positive displacement pumps that are able to deliver the required flow and pressure regardless of direction of rotation.

Response Message: SR-22-NFPA 20-2020

Public Comment No. 24-NFPA 20-2020 [New Section after 10.4.6.2.2]

Second Revision No. 53-NFPA 20-2020 [Section No. 8.4.4.2]

8.4.4.2

The discharge pressure shall ~~be permitted to~~ restabilize within 20 seconds whenever the flow condition changes.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 21:12:27 EDT 2020

Committee Statement

Committee Statement: Not having a time limit specified for discharge pressure to “re-stabilize” would potentially allow for the discharge pressure to be below the required pressure for a long period of time. The added 20 seconds provides a time limit for pressure stabilization to make the section enforceable. The change correlates with FR 64.

Response Message: SR-53-NFPA 20-2020

Second Revision No. 9-NFPA 20-2020 [Section No. 8.4.5]

8.4.5

Redundancy shall be built into the units such that failure of a line pressure sensor or primary control board will not prevent the system from ~~functioning as intended.~~ working at its full capacity with emergency-run mechanical control in accordance with 10.5.3.2 .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 20:57:11 EDT 2020

Committee Statement

Committee Statement: Fire Pump Controllers rely on redundancy due to Manual Mechanical Operation. This is not provided in a water mist system.

Response Message: SR-9-NFPA 20-2020

Public Comment No. 13-NFPA 20-2020 [Section No. 8.4.5]

Second Revision No. 19-NFPA 20-2020 [Section No. 8.4.7]

8.4.7

The unit controller shall be arranged so ~~that~~ as to comply with all of the following: ~~each pump can be manually operated individually without opening the enclosure door.~~

(1) Each motor can be manually operated individually without opening the enclosure door.

(2) A circuit breaker is incorporated for each motor in accordance with 10.4.3 and 10.4.4 .

(3) The controller for each circuit breaker operator is marked to indicate the motor it protects.

8.4.7.1

Where a single isolating switch is provided for all the unit controllers, the requirements in 10.4.2 do not apply.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 10:33:18 EDT 2020

Committee Statement

Committee Statement: The changes submitted in PC 20 are incorporated into section 8.4.7 where requirements for operating each pump manually without opening the enclosure door are found.

The NFPA 20 philosophy has always been to provide every opportunity to get the pump running. Being able to reset the circuit breaker in an emergency after a distressed pump has been corrected, is one of those opportunities. Without an external operator, emergency personnel are not likely to open the controller door to reset an internal circuit breaker. If the external operator is not required, emergency personnel will have to open the single isolating switch, open the controller door, identify which circuit breaker is to be reset, mechanically operate that switch, close the controller door, close the single isolating switch, start the pump again. This procedure will shut down all operating pumps while resetting the one pump. This most likely won't be done so the system would likely be left in a compromised state.

Each unit controller should be required to have a circuit breaker in accordance with 10.4.3 and 10.4.4 so each pump can be isolated in event of an overcurrent.

Response Message: SR-19-NFPA 20-2020

Public Comment No. 20-NFPA 20-2020 [New Section after 10.4.3.2]

Second Revision No. 13-NFPA 20-2020 [New Section after 8.4.8]

8.4.9

Water mist positive displacement pumping units shall achieve the system design discharge pressure within the time specified in the listing but not greater than 60 seconds after the start of flow from the smallest nozzle.

8.4.10

A permanently marked weatherproof metal or rigid plastic sign shall be affixed to the system that indicates the required time to achieve system design pressure as indicated in 8.4.9 .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 01 18:02:49 EDT 2020

Committee Statement

Committee Statement: The time required to achieve the system design discharge pressure needs to be evaluated as part of the listing and described in the manufacturer's design manual. The use of general requirements are not appropriate and needs to be identified during fire testing. The time limit of 60 sec is intended to accommodate large systems. The sign is necessary for acceptance testing and future periodic testing.

Response Message: SR-13-NFPA 20-2020

Public Comment No. 15-NFPA 20-2020 [Section No. 8.5.7.3]

Second Revision No. 21-NFPA 20-2020 [New Section after 8.4.8]

8.4.11

The phase reversal requirements in 10.4.6.2.1 , 10.4.6.2.2 , and 10.4.7.2.3 shall not be applicable to positive displacement pumps that are able to deliver the required flow and pressure regardless of direction of rotation.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 11:00:04 EDT 2020

Committee Statement

Committee Statement: The section is added to address all positive displacement pumps that are able to deliver the required flow and pressure, regardless of direction of rotation.

Response Message: SR-21-NFPA 20-2020

Public Comment No. 24-NFPA 20-2020 [New Section after 10.4.6.2.2]

Second Revision No. 8-NFPA 20-2020 [Section No. 8.5.5.4]

8.5.5.4

Strainer mesh size shall ~~consider~~ be based on the liquid viscosity of the concentrate and ~~be~~ in accordance with the pump manufacturer's recommendation.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Sep 30 20:51:45 EDT 2020

Committee Statement

Committee Statement: The committee decided to remove "Shall consider" as it is not an enforceable.

Response Message: SR-8-NFPA 20-2020

Public Comment No. 10-NFPA 20-2020 [Section No. 8.5.5.4]

Second Revision No. 11-NFPA 20-2020 [Section No. 8.5.7.2]

8.5.7.2

Water mist positive displacement pumping units shall be permitted to maintain system pressure under one of the following conditions: ~~that are designed and listed to alternate pressure maintenance duty between two or more pumps with variable speed pressure limiting control, and that provide a supervisory signal wherever pressure maintenance is required more than two times in one hour, shall be permitted to maintain system pressure.~~

(1) ~~are~~ Pumping unit is designed and listed to alternate pressure maintenance duty between two or more pumps with variable speed pressure-limiting control, and ~~that~~ provide a supervisory signal wherever pressure maintenance is required more than two times in one hour.

(2) Pumping unit is designed and listed to have a redundant pump when one primary pump is used for pressure maintenance duty with variable speed pressure-limiting control, and provide a supervisory signal wherever pressure maintenance is required more than two times in one hour.

(3) Pumping unit is designed to use dedicated pressure maintenance pump that is not required for primary fire pump service and provides a supervisory signal whenever pressure maintenance is required more than two times in one hour.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 01 17:36:52 EDT 2020

Committee Statement

Committee Statement: When a redundant motor or dedicated pressure maintenance pump is allowed, the failure of pressure maintenance pump would not prevent system from starting operation automatically and it would not reduce total capacity.

Response Message: SR-11-NFPA 20-2020

Public Comment No. 14-NFPA 20-2020 [Section No. 8.5.7.2]

Second Revision No. 12-NFPA 20-2020 [Section No. 8.5.7.3]

8.5.7.3

When in the pressure maintenance mode, water mist positive displacement pumping units ~~used for pressure maintenance shall not provide more than half of the nozzle flow of the~~ shall comply with 8.4.9 when the smallest system nozzle ~~when~~ is discharged at the standby pressure. ~~is applied at the smallest nozzle.~~

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 01 18:01:18 EDT 2020

Committee Statement

Committee Statement: The time required to achieve the system design discharge pressure needs to be evaluated as part of the listing and described in the manufacturer's design manual. The use of general requirements are not appropriate and needs to be identified during fire testing. The time limit of 60 sec is intended to accommodate large systems. The sign is necessary for acceptance testing and future periodic testing.

Response Message: SR-12-NFPA 20-2020

Public Comment No. 15-NFPA 20-2020 [Section No. 8.5.7.3]

Second Revision No. 23-NFPA 20-2020 [Section No. 9.2.3.4.1]

9.2.3.4.1

Alternatively, compliance with 9.2.3.4 shall be based on an assembly listed for fire pump service that complies with the following:

(1) The overcurrent protection device shall not open within 2 minutes at 600 percent full-load current.

(2) The overcurrent protection device shall not open with a restart transient of 24 times the full-load current.

(3) The overcurrent protection device shall not open within 10 minutes at 300 percent full-load current.

(4) The trip point for circuit breakers shall not be field adjustable.

(5) The overcurrent protection device shall be identified as being “Suitable for use as Service Equipment.”

(6) Where used as service equipment, the disconnecting means shall be marked “Service Disconnect.”

(7) An instantaneous trip circuit breaker shall be permitted.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 11:11:19 EDT 2020

Committee Statement

Committee Statement: This revision is required to align with the Second Revision based on PC 30 and FR 29

Response Message: SR-23-NFPA 20-2020

Public Comment No. 30-NFPA 20-2020 [Section No. 10.8.2.1.6]

Second Revision No. 62-NFPA 20-2020 [Section No. 9.3.5]

9.3.4.1

For fire pump installations using the arrangement in 9.2.2(1), 9.2.2(2), 9.2.2(3), or 9.2.2(5) for the alternate source of power, no more than one disconnecting means and associated overcurrent protection device shall be installed in the power supply to the fire pump controller in accordance with ~~9.2.3~~ 9.2.3.1 through 9.2.3.4.1 .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 30 12:40:26 EDT 2020

Committee Statement

Committee Statement: Relocate alternate source connection requirement in 9.3.5 to a new 9.3.4.1. Paragraph 9.3.5 already exists in the 2019 Edition. The change is regarding alternate power source and new 9.3.4.1, logically follows existing 9.3.4 in the 2019 edition.

Response Message: SR-62-NFPA 20-2020

Public Comment No. 26-NFPA 20-2020 [Section No. 9.3.5]

Second Revision No. 16-NFPA 20-2020 [New Section after 9.5.3.2]

9.5.3.3

Fire pump motors that are also listed as inverter duty motors shall be marked with the maximum allowable service factor amps that can be used when connected to a variable frequency drive (VFD).

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 09:41:04 EDT 2020

Committee Statement

Committee Statement: In conjunction with 10.10.2; It is common practice not to use the Service Factor when the motor is used with an inverter. The proposed new 9.5.3.3 allows the field inspectors to know what the service factor amps are to verify that they are less than the fire pump controller maximum rated inverter amps.

Response Message: SR-16-NFPA 20-2020

Public Comment No. 38-NFPA 20-2020 [New Section after 9.5.3.2]

Second Revision No. 17-NFPA 20-2020 [Section No. 10.3.3.2]

10.3.3.2

Controllers with variable-speed pressure-limiting control or variable-speed suction-limiting control shall be securely mounted in, as a minimum, a National Electrical Manufacturers Association (NEMA) Type 12, dusttight enclosure(s) or an enclosure(s) with an ingress protection (IP) rating of ~~IP51~~ IP54 .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 10:15:56 EDT 2020

Committee Statement

Committee Statement: P54 is the correct IP rating to NEMA Type 12, not IP51 according to NEMA 250, Annex A.

Response Message: SR-17-NFPA 20-2020

Public Comment No. 27-NFPA 20-2020 [Section No. 10.3.3.2]

Second Revision No. 18-NFPA 20-2020 [Section No. 10.3.7.3]

10.3.7.3* Operating and Installation Instructions.

~~Complete instructions covering the operation of the controller shall be provided and conspicuously mounted on the controller.~~

10.3.7.3.1

The following basic operating instructions, as a minimum, for emergency response operation of the controller shall be mounted on the exterior of the controller:

(1) Opening and closing sequence of the normal and emergency isolating switches, if separate from the circuit breaker

(2) Opening and closing sequence of the normal and emergency circuit breakers

(3) Operating the emergency-run mechanical control

(4) Starting the pump by manual electrical means

(5) Stopping the pump by manual electrical means

10.3.7.3.2

The following complete installation instructions, as a minimum, shall be provided with the controller without requiring access to a website or other electronic means:

(1) Location and size of mounting holes

(2) Suitable locations for conduit entrance

(3) Location of plumbing connection

(4) Input and output lug sizes for power wiring

(5) Input and output lug sizes for remote alarm and control functions

(6) External connection drawing

10.3.7.3.3

The following advanced operating instructions, as a minimum, for the fire pump controller other than what is required in 10.3.7.3.1 shall be provided with the controller, or, at the option of the manufacturer, based on the model or the serial number, made accessible on the manufacturer's website or through other electronic means:

(1) Description of the model, including all options

(2) Product specifications

(3) Menu functions

(4) Settings

(5) Maintenance

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 10:19:51 EDT 2020

Committee Statement

Committee Statement: This revision restores resolved PI No. 28 but is renumbered and reworded to allow the manufacturer the option of making the operating instructions accessible electronically.

While the interactive displays on controllers provide some of the documentation, it is noted that the basic operating instructions need to be provided on the door as shown in the revision. The revision separates operating instructions from installation instructions and identifies minimum information required. Installation instructions are necessary to install the equipment and may not be available if supplied only by electronic means.

Response Message: SR-18-NFPA 20-2020

Public Comment No. 28-NFPA 20-2020 [Section No. 10.3.7.3]

Second Revision No. 20-NFPA 20-2020 [New Section after 10.4.5.6.2]

10.4.5.6.3

It shall be permitted for dc coils to be powered from the system dc power supply, provided the power supply control circuit is rated for continuous supply of the maximum coil pull-in current, and all other possible loads.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 02 10:41:42 EDT 2020

Committee Statement

Committee Statement: Small DC coils powered by the DC power supply can be acceptable as long as the DC power supply circuit is rated for the pull-in current of the main contactor coil. This prevents damage to the control circuit or power supply due to a frozen coil since these circuits cannot be protected in accordance with 10.3.5.1.

The requirement for redundant transformers is deleted as the emergency mechanical operator provides backup in case of any single point failure of the control circuit.

Response Message: SR-20-NFPA 20-2020

Public Comment No. 23-NFPA 20-2020 [New Section after 10.4.5.6.2]

Second Revision No. 44-NFPA 20-2020 [Section No. 10.4.7.2.6]

10.4.7.2.6 Controller or System Trouble.

As a minimum, a controller or system trouble alarm shall actuate whenever any of the following alarms occur:

(1) Ground-fault signal, where provided *(see 10.4.5.9)*

(2) Pressure-sensing device signals*(see 10.5.2.1.3.1 and 10.5.2.1.3.2)*

(3) ~~Adjustable~~ Variable -speed trouble signals *(see 10.10.8.1, 10.10.8.2, and 10.10.3)*

(4) Fail-to-start signal *(see 10.5.2.7.5)*

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:23:03 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-44-NFPA 20-2020

Second Revision No. 52-NFPA 20-2020 [Section No. 10.8.2.1.3.2]

~~10.8.2.1.3.2~~

~~For fire pump installations using one disconnecting means and associated overcurrent protection device installed in the alternate power supply to the fire pump controller as permitted in 9.2.3.4.1 , an instantaneous-trip circuit breaker shall be permitted in lieu of the overcurrent device specified in 9.2.3.4 provided it is part of an assembly listed for fire pump service and complies with 9.2.3.4 .~~

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 20:31:24 EDT 2020

Committee Statement

Committee Statement: The requirement of maximum one disconnecting means allowance for alternate source of power is created in section 9.3.5 with a first revision. Chapter 10 is not the correct chapter to make power supply requirements and due to new section 9.3.5, section 10.8.2.1.3.2 is no longer needed and therefore removed from the standard.

Response Message: SR-52-NFPA 20-2020

Public Comment No. 29-NFPA 20-2020 [Section No. 10.8.2.1.3.2]

Second Revision No. 25-NFPA 20-2020 [Section No. 10.8.3.6.1]

10.8.3.6.1

The power transfer switch shall be provided with undervoltage-sensing devices to monitor all ungrounded lines of the normal and alternate power sources .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 15:27:39 EDT 2020

Committee Statement

Committee Statement: Section is revised to combine the underground line monitoring requirements into one paragraph as all transfer switches need to provide monitoring of all ungrounded sources.

Response Message: SR-25-NFPA 20-2020

Public Comment No. 31-NFPA 20-2020 [Section No. 10.8.3.6.1]

Second Revision No. 26-NFPA 20-2020 [Section No. 10.8.3.7]

10.8.3.7 Voltage- and Frequency-Sensing Devices.

~~Unless the requirements of 10.8.3.7.3 are met, the requirements of 10.8.3.7.1 and 10.8.3.7.2 shall apply.~~

~~**10.8.3.7.1**~~

~~Voltage- and frequency-sensing devices shall be provided to monitor all ungrounded conductors of the alternate power source.~~

~~**10.8.3.7.2**~~

~~Transfer to the alternate source shall be inhibited until there is adequate voltage and frequency to serve the fire pump load.~~

~~**10.8.3.7.3**~~

~~Where the fire pump controller is marked to indicate that the alternate source is provided by a second utility power source, the requirements of 10.8.3.7.1 and 10.8.3.7.2 shall not apply to the frequency-sensing device.~~

10.8.3.7.1

Where the alternate source is an on-site standby generator, the following shall apply;

(1) A frequency-sensing device shall be provided.

(2) Transfer to the alternate source shall be inhibited until there is adequate voltage and frequency to serve the fire pump load.

10.8.3.7.2

Where an alternate source is a second utility and a frequency-sensing device is not provided, the controller shall be marked suitable for use only with utility supply on the alternate source.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 15:45:18 EDT 2020

Committee Statement

Committee Statement: Section is revised to combine the underground line monitoring requirements into one paragraph as all transfer switches need to provide monitoring of all ungrounded sources.

Response Message: SR-26-NFPA 20-2020

Public Comment No. 32-NFPA 20-2020 [Section No. 10.8.3.7]

Second Revision No. 45-NFPA 20-2020 [Section No. 10.10.1.3.1]

10.10.1.3.1

The output current rating of the ~~adjustable speed drive (ASD)~~ variable frequency drive (VFD) as marked on the nameplate of the controller shall not be exceeded when operating the motor at the maximum pump horsepower in accordance with 4.11.3.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:24:36 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-45-NFPA 20-2020

Second Revision No. 58-NFPA 20-2020 [Section No. 10.10.1.4]

10.10.1.4 Torque Loads.

~~Controllers for motors driving constant torque loads, such as positive displacement water mist or additive (foam) pumps shall be rated for constant torque applications, and the adjustable speed drive (ASD) unit in such controllers shall be rated for constant torque motor load.~~

10.10.1.4.1

Controllers for motors driving constant torque loads, such as positive displacement water mist or additive (foam) pumps, shall be rated for constant torque applications.

10.10.1.4.2

~~the adjustable speed drive (ASD)~~ The variable frequency drive (VFD) unit in ~~such~~ controllers for motors driving constant torque loads shall be rated for constant torque motor load.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Oct 28 11:04:10 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-58-NFPA 20-2020

Second Revision No. 46-NFPA 20-2020 [Section No. 10.10.2]

10.10.2 Additional Marking.

In addition to the markings required in 10.1.2.5.1, the controller shall be marked with both of the following:

(1) Maximum ambient temperature rating

(2) Output current rating of the ~~adjustable speed drive (ASD)~~ variable frequency drive (VFD)

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:25:50 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-46-NFPA 20-2020

Second Revision No. 51-NFPA 20-2020 [Section No. 10.10.3.1]

10.10.3.1*

~~Upon~~ When the variable frequency drive is not at line frequency, and upon failure of the variable speed pressure- limiting, control to keep the system pressure ~~at or above~~ within 10 percent of the set pressure of the variable speed pressure- limiting control system for more than 15 seconds , the controller shall bypass and isolate the variable speed pressure- limiting control system and operate the pump at rated speed.

10.10.3.1.1* Low-Pressure Bypass .

If the system pressure remains below ~~the set~~ this pressure for more than 15 seconds, the bypass operation shall occur.

A.10.10.3.1.1

The low-pressure bypass setting should be set between the set pressure of the variable speed pressure-limiting control system and 90 percent of the system pressure when the pump is operating at 150 percent flow. It should never be set at or below maximum expected suction pressure.

10.10.3.1.2* Drive Not Operational.

If the variable speed drive indicates that it is not operational within 5 seconds, the bypass operation shall occur.

10.10.3.1.3* In-Rush Currents.

Means shall be provided to prevent higher than normal in-rush currents when transferring the fire pump motor from the variable speed mode to the bypass mode.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:39:30 EDT 2020

Committee Statement

Committee Statement: When the variable frequency drive runs at rated frequency, the drive should not bypass based on the set pressure, however it should still bypass after 150 percent flow. The revised text is added to allow for a lower bypass pressure setting based on the system pressure being below the pressure at 150 percent flow. The annex is added to provide guidance as to how to set the Low Pressure Bypass.

Response Message: SR-51-NFPA 20-2020

Second Revision No. 66-NFPA 20-2020 [Section No. 10.10.3.4]

10.10.3.4 ~~Automatic Shutdown.~~

When the variable speed pressure limiting control is bypassed, automatic shutdown of the controller shall be as permitted by 10.5.4.2.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Dec 11 09:29:16 EST 2020

Committee Statement

Committee Statement: Title deleted as per NFPA Manual of Style

Response Message: SR-66-NFPA 20-2020

Second Revision No. 47-NFPA 20-2020 [Section No. 10.10.6.1.1]

10.10.6.1.1

A line reactor rated for continuous duty shall be provided and be installed ahead of the ~~adjustable-speed~~ variable frequency drive with a minimum impedance rating of 5 percent.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:26:57 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-47-NFPA 20-2020

Second Revision No. 48-NFPA 20-2020 [Section No. 10.10.6.1.2]

10.10.6.1.2

A reactor provided as an integral part of ~~an adjustable speed~~ a variable frequency drive shall be permitted to satisfy all or part of the 5 percent impedance if the reactor is connected on the line side of the converter (i.e., rectifier) section of the ~~adjustable-speed~~ variable frequency drive.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:27:39 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-48-NFPA 20-2020

Second Revision No. 55-NFPA 20-2020 [Section No. 10.10.9.4.1]

10.10.9.4.1

The discharge pressure shall ~~be permitted to~~ restabilize within 20 seconds whenever the flow condition changes.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 21:23:43 EDT 2020

Committee Statement

Committee Statement: Not having a time limit specified for discharge pressure to “re-stabilize” would potentially allow for the discharge pressure to be below the required pressure for a long period of time. The added 20 seconds provides a time limit for pressure stabilization to make the section enforceable. The change correlates with FR 64.

Response Message: SR-55-NFPA 20-2020

Second Revision No. 57-NFPA 20-2020 [Section No. 10.11]

~~**10.11** Data Storage.~~

~~Where required, data registers shall be provided in the controller.~~

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 21:35:32 EDT 2020

Committee Statement

Committee Statement: Connectivity provisions were not accepted in the First Draft. In light of this section 10.11 is removed from the standard.

Response Message: SR-57-NFPA 20-2020

Public Comment No. 35-NFPA 20-2020 [Section No. 10.11]

Public Comment No. 11-NFPA 20-2020 [Section No. 10.11]

Second Revision No. 56-NFPA 20-2020 [Section No. 11.2.4.3.5.1]

11.2.4.3.5.1

The discharge pressure shall ~~be permitted to~~ restabilize within 20 seconds whenever the flow condition changes.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 21:27:35 EDT 2020

Committee Statement

Committee Statement: Not having a time limit specified for discharge pressure to “re-stabilize” would potentially allow for the discharge pressure to be below the required pressure for a long period of time. The added 20 seconds provides a time limit for pressure stabilization to make the section enforceable. The change correlates with FR 64.

Response Message: SR-56-NFPA 20-2020

Second Revision No. 61-NFPA 20-2020 [Section No. 11.2.7.3.9]

11.2.7.3.10

~~Means~~ Where used as the primary cranking system, means shall be provided to manually recharge, bleed, and purge the hydraulic accumulator system.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 30 11:57:57 EDT 2020

Committee Statement

Committee Statement: The change clarifies that an engine driven recharge is not required for a secondary system and a secondary starting/cranking means is not required.

Response Message: SR-61-NFPA 20-2020

Second Revision No. 60-NFPA 20-2020 [Section No. 11.2.7.3.10]

11.2.7.3.9

~~When~~ Where the engine is equipped with multiple cranking systems (of different types), one system shall be defined as a primary cranking system and the other as a secondary cranking system.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Fri Oct 30 11:50:55 EDT 2020

Committee Statement

Committee Statement: Old section 11.2.7.3.10 has been renumbered as 11.2.7.3.9 in order to provide clarification between the requirements of primary and secondary hydraulic starting not requiring engine driven recharge for secondary systems.

Response Message: SR-60-NFPA 20-2020

Second Revision No. 49-NFPA 20-2020 [New Section after 11.2.7.4.4.9]

11.2.7.4.4.10

Where used as the primary cranking system, there shall be a system recharge air compressor driven by the fire pump engine.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:30:19 EDT 2020

Committee Statement

Committee Statement: The requirement of 'at the required air pressure' and 'reliable' are new requirements. The deleted text is moved to a new section 11.2.7.4.4.10 to separate two requirements and for additional change to the requirement.

Response Message: SR-49-NFPA 20-2020

Second Revision No. 50-NFPA 20-2020 [Section No. 11.2.7.4.4.9]

11.2.7.4.4.9

There shall be a separate, ~~suitably~~ powered automatic air compressor or means of obtaining air at the required air pressure from some other ~~system, independent of the compressor driven by the fire pump engine~~ reliable system .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 18:32:40 EDT 2020

Committee Statement

Committee Statement: The requirement of 'at the required air pressure' and 'reliable' are new requirements. The deleted text is moved to a new section 11.2.7.4.4.10 to separate two requirements and for additional change to the requirement. The change provides clarification between the requirements of primary and secondary air starting systems not requiring engine driven recharge for secondary systems.

Response Message: SR-50-NFPA 20-2020

Second Revision No. 29-NFPA 20-2020 [Section No. 11.4.1.3.1]

11.4.1.3.1*

Fuel supply tank(s) shall ~~have a capacity at least equal to 1 gal per hp (5.07 L per kW)~~ be sized for a minimum of 12 hours of engine run time based on the fuel supply rate requirements of the engine , plus 5 percent volume for expansion and 5 percent volume for sump.

See SR-63

Detail SR-64

11.4.1.3.1.1*

When the fuel supply rate requirements of the engine are not known, fuel supply tank(s) shall have a capacity at least equal to 1 gal per hp (5.07 L per kW), plus 5 percent volume for expansion and 5 percent volume for sump.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 16:26:48 EDT 2020

Committee Statement

Committee Statement: The change allows fuel tanks to be sized more realistically based upon the efficiency of new engines. 8 Hours is changed to 12 hours in order to support the requirement of refilling at 66% of tank capacity as per section 11.6.4.1. This ensures 8 hours of engine run time.

Response Message: SR-29-NFPA 20-2020

Public Comment No. 48-NFPA 20-2020 [Section No. 11.4.1.3.1]

Second Revision No. 30-NFPA 20-2020 [Section No. 11.4.5.4]

11.4.5.4

The grade of fuel oil shall be indicated on the fuel tank by letters that are a minimum of ~~6 in~~ 2 in . (~~152 mm~~ 50 mm) in height and in contrasting color to the tank.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 16:36:55 EDT 2020

Committee Statement

Committee Statement: 2” tall contrasting color letter is adequate to been seen in the pump room. 2” letter decals are more readily available at most supply houses whereas 6” letters often push installers/end users to custom graphic houses.

Response Message: SR-30-NFPA 20-2020

Public Comment No. 45-NFPA 20-2020 [Section No. 11.4.5.4]

Second Revision No. 32-NFPA 20-2020 [Section No. 14.2.3.1]

14.2.3.1

The arc flash risk assessment required by ~~Article 130.5 of~~ NFPA 70E or an approved local equivalent shall be performed for all electric fire pump controllers.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 17:21:29 EDT 2020

Committee Statement

Committee Statement: The specific section in NFPA 70E is removed to eliminate the need for future revision of NFPA 20, should NFPA 70E change the location of the requirements or arc flash risk assessment. The change is based on PC-36 and SR-31.

Response Message: SR-32-NFPA 20-2020

Second Revision No. 31-NFPA 20-2020 [Section No. 14.2.3.2]

14.2.3.2

Electric fire pump controllers shall be field labeled for arc flash risk in accordance with ~~Article 130.5(H) of~~ NFPA 70Eor an approved local equivalent .

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 16:43:35 EDT 2020

Committee Statement

Committee Statement: The requirement of NFPA 70E is for a label that is applied in the field. This label will be applied by the owner of the electrical equipment in the field after all the required information is determined. The specific section in NFPA 70E is removed to eliminate the need for future revision of NFPA 20, should NFPA 70E change the location of the requirements or arc flash risk assessment.

Response Message: SR-31-NFPA 20-2020

Public Comment No. 36-NFPA 20-2020 [Section No. 14.2.3.2]

Second Revision No. 37-NFPA 20-2020 [Section No. 14.2.6]

14.2.6* Field Acceptance Test Procedures.

14.2.6.1* Test Equipment.

14.2.6.1.1

Calibrated test equipment shall be provided to determine net pump pressures, rate of flow through the pump, volts and amperes, and speed.

14.2.6.1.2

Calibrated test gauges, transducers, and other devices used for measurements required in 14.2.6.1.1~~during the test~~ , and which bear a label with the latest date of calibration, shall be used ~~and shall bear a label with the latest date of calibration~~ during the test .

14.2.6.1.2.1

Gauges, transducers, and other devices used for measurements required in 14.2.6.1.1 during the test shall be calibrated annually at minimum.

14.2.6.1.2.2

Calibration of gauges, transducers, and other devices used for measurements required in 14.2.6.1.1 during the test shall be maintained at an accuracy level of ±1 percent.

14.2.6.1.2.3

Fire pump controller voltage and current readings on controllers that are factory calibrated and adjusted to ±2 percent shall be permitted to be used in lieu of calibrated volt/amp meters for the acceptance test.

14.2.6.1.2.4

Fixed outlet flow devices shall be inspected for damage, but they shall not require calibration.

14.2.6.1.3

Discharge and sensing orifices that can be visually observed without disassembling equipment, piping, or valves shall be both of the following: ~~visually inspected and shall be free of damage and obstructions that could affect the accuracy of the measurement.~~

(1) ~~visually~~ Visually inspected

(2) ~~free~~ Free of damage and obstructions that could affect the accuracy of the measurement

14.2.6.1.4

Discharge orifices shall be listed or constructed to a recognized standard with a known discharge coefficient.

14.2.6.1.5

Requirements for personal protective equipment and procedures in accordance with *NFPA 70E* shall be followed when working near energized electrical or rotating equipment.

14.2.6.2 Automated Inspection and Testing Devices and Equipment.

14.2.6.2.1

Automated inspection and testing devices and equipment installed on the fire pump system shall be tested to ensure the accuracy of the automated inspection and testing devices and equipment.

14.2.6.2.1.1

Automated inspection devices and equipment shall be proven to be as effective as a visual examination.

14.2.6.2.1.2

Automated testing devices and equipment shall produce the same action required by this standard to test a device.

14.2.6.2.2

The testing shall discharge water where required by this standard and NFPA 25.

14.2.6.2.3

Failure of a component or system to pass an automated inspection or test shall result in an audible trouble signal in accordance with *NFPA 72*.

14.2.6.3* Fire Pump Flow Testing(s).

A.14.2.6.3

A sample procedure is as follows:

(1) Make a visual check of the unit. If hose and nozzles are used, see that they are securely tied down. See that the hose valves are closed. If a test meter is used, the valve on the discharge side of the meter should be closed.

(2) Start the pump.

(3) Partially open one or two hose valves, or slightly open the meter discharge valve.

(4) Check the general operation of the unit. Watch for vibration, leaks (oil or water), unusual noises, and general operation. Adjust packing glands.

(5) Measure water discharge. The steps to do so are as follows:

(a) Where a test valve header is used, regulate the discharge by means of the hose valves and a selection of the nozzle tips. It will be noticed that the play pipe has a removable tip. This tip has a 1⅛ in. (28.6 mm) nozzle, and when the tip is removed, the play pipe has a 1¾ in. (44.4 mm) nozzle. Hose valves should be shut off before removing or putting on the 1⅛ in. (28.6 mm) tip.

(b) Where a test meter is used, regulate the discharge valve to achieve various flow readings.

(c) Important test points are at 150 percent rated capacity, rated capacity, and shutoff. Intermediate points can be taken if desired to help develop the performance curve.

(6) Record the following data at each test point *[see the sample form shown in ~~Figure A.14.2.6.6(a)~~ Figure A.14.2.6.3(a)]*:

(a) Pump rpm

(b) Suction pressure

(c) Discharge pressure

(d) Number and size of hose nozzles, pitot pressure for each nozzle, and total gpm (L/min); for test meter, simply a record of gpm (L/min)

(e) Amperes (each phase for electric motor–driven pump)

(f) Volts (phase to phase for electric motor–driven pump)

(g) Engine back pressure (for diesel engine drive pump)

(h) Oil pressure (for diesel engine drive pump)

(i) Cooling loop water pressure (for diesel engine drive pump)

(j) Engine temperature (for diesel engine drive pump)

(k) Steam pressure (for steam drive pump)

(7) Evaluate test results as follows:

(a) *Discharge Flow and Pressure.* Verify that the discharge flow and pressure is adequate to supply the fire protection demand.

(b) *Rated Speed.* Verify whether the pump is operating at or close to rated rpm. Pump speeds that vary significantly from the original pump design speed(s) should be investigated and corrected.

(c) *Capacity.* For the hose valve header, using appropriate formulas or a fire stream table that matches the orifice characteristics, determine the gpm (L/min) for each nozzle at each pitot reading. For example, 16 psi (1.1 bar) pitot pressure with 1¾ in. (44.4 mm) nozzle with a coefficient of 0.975 indicates 356 gpm (1348 L/min). Add the gpm for each hose line to determine total volume. For the test meter, the total gpm (L/min) is read directly. The formula for calculating a flow from a pitot pressure is:

Flow:

$$Q = 29.83CD^2P^{0.5}$$ [A.14.2.6.6a A

where:

Q = flow through the orifice in gpm

C = orifice discharge coefficient

D = orifice diameter in inches

P = pitot pressure in inches

(d) *Total Head for Horizontal Pump*. Total head is the sum of the following:

i. Pressure measured by the discharge gauge at pump discharge flange

ii. Velocity head difference, pump discharge, and pump suction

iii. Gauge elevation corrections to pump centerline (plus or minus)

iv. Pressure measured by suction gauge at pump suction flange — negative value when pressure is above 0

(e) *Total Head for Vertical Pump.* Total head is the sum of the following:

i. Pressure measured by the discharge gauge at pump discharge flange

ii. Velocity head at the discharge flange

iii. Distance to the supply water level

iv. Discharge gauge elevation correction to centerline of discharge

(f) *Electrical Input.* Voltage and amperes are read directly from the volt/ammeter. This reading is compared to the motor nameplate full-load amperes. The only general calculation is to determine the maximum amperes allowed due to the motor service factor. In the case of 1.15 service factor, the maximum amperes are approximately 1.15 times motor amperes, because changes in power factor and efficiency are not considered. If the maximum amperes recorded on the test do not exceed this figure, the motor and pump will be judged satisfactory. It is most important to measure voltage and amperes accurately on each phase should the maximum amperes logged on the test exceed the calculated maximum amperes. This measurement is important because a poor power supply with low voltage will cause a high ampere reading. This condition can be corrected only by improvement in the power supply. There is nothing that can be done to the motor or the pump.

(g) *Correction to Rated Speed.* For purposes of evaluation and plotting, the capacity, head, and power should be corrected from the test values at test speed to the rated speed of the pump. The corrections are made as follows. Capacity:

$$Q_2 = \left(\frac{N_2}{N_1}\right)Q_1$$ [A.14.2.6.6b A

where:

Q_1 = capacity at test speed in gpm (L/min)

Q_2 = capacity at rated speed in gpm (L/min)

N_1 = test speed in rpm

N_2 = rated speed in rpm

Head:

$$H_2 = \left(\frac{N_2}{N_1}\right)^2 H_1$$ [~~A.14.2.6.6c~~ A

where:

H_1 = head at test speed in ft (m)

H_2 = head at rated speed in ft (m)

Horsepower:

$$hp_2 = \left(\frac{N_2}{N_1}\right)^3 hp_1$$ [~~A.14.2.6.6d~~ A

where:

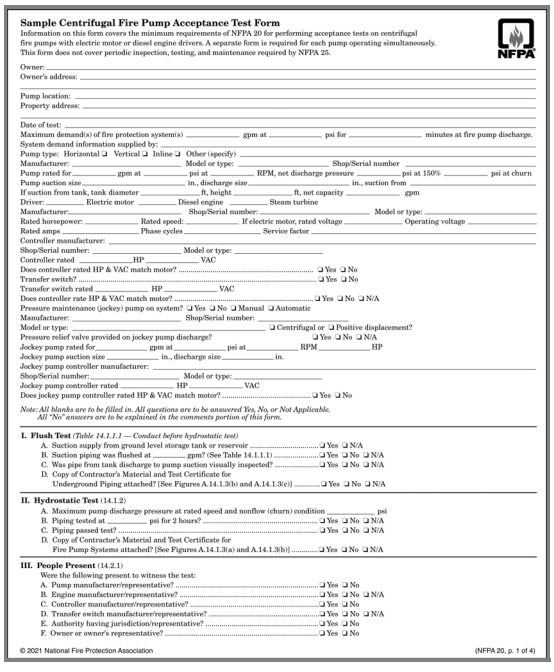
hp_1 = kW (horsepower) at test speed

hp_2 = kW (horsepower) at rated speed

(h) In general, a head-capacity curve *[see ~~Figure A.14.2.6.6(b)~~ Figure A.14.2.6.3(b) and ~~Figure A.14.2.6.6(c)~~ Figure A.14.2.6.3(c)]* and an ampere-capacity curve *[see ~~Figure A.14.2.6.6(d)~~ Figure A.14.2.6.3(d)]* should be plotted. A study of these curves will show the performance picture of the pump as it was tested.

(i) The final step of the evaluation is to document and notify the appropriate authorities of the fire pump status, which includes whether the fire pump passed or failed, if the fire pump was left in service, and any issues that were identified. Any outstanding issues should be addressed and a retest scheduled if necessary.

Figure A.14.2.6.3(a) Centrifugal Fire Pump Acceptance Test Form.



Sample Centrifugal Fire Pump Acceptance Test Form

Information on this form covers the minimum requirements of NFPA 20 for performing acceptance tests on centrifugal fire pumps with electric motor or diesel engine drivers. A separate form is required for each pump operating simultaneously. This form does not cover periodic inspection, testing, and maintenance required by NFPA 25.

Owner:
Owner's address:
Pump location:
Property address:
Date of test:
Maximum demand(s) of fire protection system(s) _____ gpm at _____ psi for _____ minutes at fire pump discharge.
System demand information supplied by:
Pump type: Horizontal ❑ Vertical ❑ Inline ❑ Other (specify)
Manufacturer: _____ Model or type: _____ Shop/Serial number
Pump rated for _____ gpm at _____ psi at _____ RPM, net discharge pressure _____ psi at 150% _____ psi at churn
Pump suction size _____ in., discharge size _____ in., suction from _____
If suction from tank, tank diameter _____ ft, height _____ ft, net capacity _____ gpm
Driver: _____ Electric motor _____ Diesel engine _____ Steam turbine
Manufacturer: _____ Shop/Serial number: _____ Model or type: _____
Rated horsepower: _____ Rated speed: _____ If electric motor, rated voltage _____ Operating voltage _____
Rated amps _____ Phase cycles _____ Service factor _____
Controller manufacturer: _____
Shop/Serial number: _____ Model or type: _____
Controller rated _____ HP _____ VAC
Does controller rated HP & VAC match motor? ❑ Yes ❑ No
Transfer switch? ❑ Yes ❑ No
Transfer switch rated _____ HP _____ VAC
Does controller rate HP & VAC match motor? ❑ Yes ❑ No ❑ N/A
Pressure maintenance (jockey) pump on system? ❑ Yes ❑ No ❑ Manual ❑ Automatic
Manufacturer: _____ Shop/Serial number: _____
Model or type: _____ ❑ Centrifugal or ❑ Positive displacement?
Pressure relief valve provided on jockey pump discharge? ❑ Yes ❑ No ❑ N/A
Jockey pump rated for _____ gpm at _____ psi at _____ RPM _____ HP
Jockey pump suction size _____ in., discharge size _____ in.
Jockey pump controller manufacturer: _____
Shop/Serial number: _____ Model or type: _____
Jockey pump controller rated _____ HP _____ VAC
Does jockey pump controller rated HP & VAC match motor? ❑ Yes ❑ No

Note: All blanks are to be filled in. All questions are to be answered Yes, No, or Not Applicable. All "No" answers are to be explained in the comments portion of this form.

I. Flush Test *(Table 14.1.1.1 — Conduct before hydrostatic test)*
A. Suction supply from ground level storage tank or reservoir ❑ Yes ❑ N/A
B. Suction piping was flushed at _____ gpm? (See Table 14.1.1.1) ❑ Yes ❑ No ❑ N/A
C. Was pipe from tank discharge to pump suction visually inspected? ❑ Yes ❑ No ❑ N/A
D. Copy of Contractor's Material and Test Certificate for Underground Piping attached? [See Figures A.14.1.3(b) and A.14.1.3(c)] ❑ Yes ❑ No ❑ N/A

II. Hydrostatic Test (14.1.2)
A. Maximum pump discharge pressure at rated speed and nonflow (churn) condition _____ psi
B. Piping tested at _____ psi for 2 hours? ❑ Yes ❑ No ❑ N/A
C. Piping passed test? ❑ Yes ❑ No ❑ N/A
D. Copy of Contractor's Material and Test Certificate for Fire Pump Systems attached? [See Figures A.14.1.3(a) and A.14.1.3(b)] ❑ Yes ❑ No ❑ N/A

III. People Present (14.2.1)
Were the following present to witness the test:
A. Pump manufacturer/representative? ❑ Yes ❑ No
B. Engine manufacturer/representative? ❑ Yes ❑ No ❑ N/A
C. Controller manufacturer/representative? ❑ Yes ❑ No
D. Transfer switch manufacturer/representative? ❑ Yes ❑ No ❑ N/A
E. Authority having jurisdiction/representative? ❑ Yes ❑ No
F. Owner or owner's representative? ❑ Yes ❑ No

 (NFPA 20, p. 1 of 4)

IV. Electric Wiring

A. Was all electric wiring including control interwiring for multiple pumps alternate power supply and the jockey pump completed and checked by the electrical contractor prior to the initial start-up and acceptance test? ..... ❑ Yes ❑ No ❑ N/A

V. Flow Test

A. Is a copy of the manufacturer's certified pump test curve attached? ..... ❑ Yes ❑ No
B. Test results compared to the manufacturer's certified pump test curve? ..... ❑ Yes ❑ No
C. Gauges and other test equipment calibrated? ..... ❑ Yes ❑ No
D. No vibrations that could potentially damage any fire pump component? ..... ❑ Yes ❑ No ❑ N/A
E. The fire pump performed at all conditions without objectionable overheating of any component? ..... ❑ Yes ❑ No ❑ N/A
F. For each test, record the required information for each load condition using the following formulas (or other acceptable methods) and tables:

$$P_{Net} = P_{Discharge} - P_{Suction}$$

$$Q = 29.83\, cd^2 P^{0.5}$$

$$Pv = 0.433352V^2/(2g) = (Q^2)/(890.47D^4)$$

Where

P_{Net} = Net pump pressure (psi)
$P_{Discharge}$ = Total pressure at the pump discharge (psi)
$P_{Suction}$ = Total pressure at the pump suction (psi)
Q = Flow through a circular orifice (gpm)
c = Nozzle discharge coefficient
d = Nozzle orifice diameter (in.)
P = Pressure measured on gauge (pitot)
Pv = Velocity pressure (psi)
V = Velocity of liquid (ft/sec)
g = Gravitational constant (32.174 ft/sec)
D = Internal pipe diameter (in.)

Test	Pump speed (rpm)	Suction pressure (psi)	Discharge pressure (psi)	Nozzle size (in.)_____ Nozzle coef. _____ Pitot readings (psi) 1	2	3	4	5	6	Flow (gpm)	Net pressure (psi)	Rpm adjusted net pressure (psi)	Rpm adjusted flow (psi)	Suction velocity pressure (psi)[1]	Discharge velocity pressure (psi)[1]	Velocity adjusted pressure (psi)[1]	Oil pressure: (psi)[2]	Exhaust back pressure (psi)[2]	Diesel water temperature[2]	Cooling loop pressure (psi)[2]
0%																				
25%																				
50%																				
75%																				
100%																				
125%																				
150%																				
0%																				
100%																				
150%																				

Pump is ❑ Constant speed ❑ Variable speed

Notes:
[1]Velocity pressure adjustments provide a more accurate analysis in most cases and as a minimum should be included whenever the pump suction and discharge diameters are different and the pump falls by a narrow margin. The actual internal diameter of the pump suction and discharge should be obtained from the manufacturer.
[2]These readings are applicable to diesel engine pumps only. Recording these readings is not specifically required in Chapter 14.

For electric motor–driven pumps also record:

Test	Voltage			Amperes		
	L1-L2	L2-L3	L1-L3	L1	L2	L3
0%						
25%						
50%						
75%						
100%						
125%						
150%						
0%						
100%						
150%						

G. For electric motors operating at rated voltage and frequency, is the ampere demand less than or equal to the product of the full load ampere rating times the allowable service factor as stamped on the motor name plate? ..... ❑ Yes ❑ No ❑ N/A

H. For electric motors operating under varying voltage:
1. Was the product of the actual voltage and current demand less than or equal to the product of the rated full load current times the rated voltage times the allowable service factor? ..... ❑ Yes ❑ No ❑ N/A
2. Was the voltage always less than 5% above the rated voltage during the test? ..... ❑ Yes ❑ No ❑ N/A
3. Was the voltage always less than 10% above the rated voltage during the test? ..... ❑ Yes ❑ No ❑ N/A
I. Did engine-driven units operate without any signs of overload or stress? ..... ❑ Yes ❑ No ❑ N/A
J. Was the engine overspeed emergency shutdown tested? ..... ❑ Yes ❑ No ❑ N/A
K. Was the governor set to properly regulate the engine speed at rated pump speed? ..... ❑ Yes ❑ No ❑ N/A
L. Did the gear drive assembly operate without excessive objectionable noise, vibration, or heating? ..... ❑ Yes ❑ No ❑ N/A
M. Was the fire pump unit started and brought up to rated speed without interruption under the conditions of a discharge equal to peak load? ..... ❑ Yes ❑ No ❑ N/A
N. Did the fire pump performance equal the manufacturer's factory curve within the accuracy limits of the test equipment? ..... ❑ Yes ❑ No ❑ N/A
O. Did the electric motor pumps pass phase reversal test on normal and alternate (if provided) power? ..... ❑ Yes ❑ No ❑ N/A

VI. Multiple Pump Operation

A. _____ fire pumps are required to operate ❑ in series ❑ in parallel ❑ N/A to meet the maximum fire protection demand.
B. Record the following information for each of the _____ pumps operating simultaneously.

Test	Pump speed (rpm)	Suction pressure (psi)	Discharge pressure (psi)	Nozzle size (in.)_____ Nozzle coef. _____ Pitot readings (psi) 1	2	3	4	5	6	7	8	9	10	11	12	Net pressure (psi)	Total flow (gpm)	Flow through this pump (gpm)	Rpm adjusted net pressure (psi)	RPM adjusted flow (psi)	Suction velocity pressure (psi)	Suction velocity pressure (psi)	Velocity adjusted net pressure (psi)
0%																							
25%																							
50%																							
75%																							
100%																							
125%																							
150%																							
0%																							
100%																							
150%																							

Pump is ❑ Constant speed ❑ Variable speed

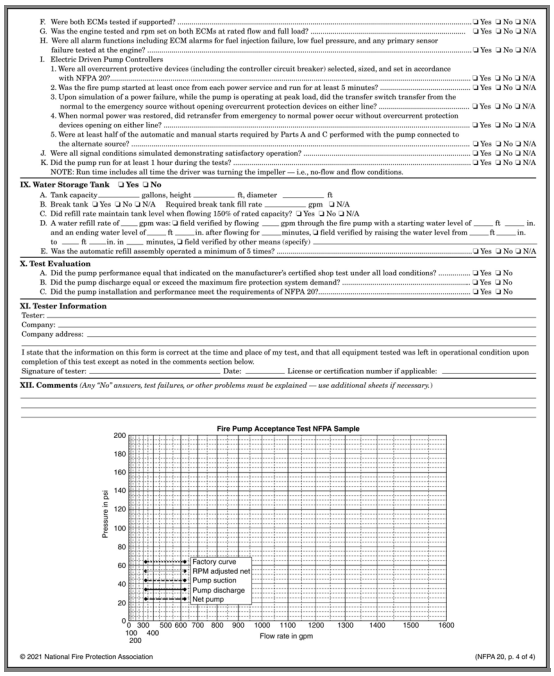
C. Did the fire pump performance equal the manufacturer's factory curve within the accuracy limits of the test equipment during the multiple test? ..... ❑ Yes ❑ No ❑ N/A

VII. Main Pressure Relief Valve

A. Is a main pressure relief valve installed on the fire pump discharge? ❑ Yes ❑ No
B. During variable speed performance testing, what was the flow rate through the main pressure relief valve at churn?
❑ No flow ❑ Weeping flow ❑ More than weeping flow ❑ Substantial flow ❑ N/A
C. During variable speed performance testing, what was the flow rate through the main pressure relief valve at rated flow?
❑ No flow ❑ Weeping flow ❑ More than weeping flow ❑ Substantial flow ❑ N/A
D. During constant speed performance testing, what was the flow rate through the main pressure relief valve at churn?
❑ No flow ❑ Weeping flow ❑ More than weeping flow ❑ Substantial flow ❑ N/A
E. During constant speed performance testing, what was the flow rate through the main pressure relief valve at rated flow?
❑ No flow ❑ Weeping flow ❑ More than weeping flow ❑ Substantial flow ❑ N/A
F. After resetting the pressure relief valve after performance testing, under variable speed operation, what was the flow rate through the main pressure relief valve at churn? ❑ No flow ❑ Weeping flow ❑ More than weeping flow ❑ Substantial flow ❑ N/A
G. After resetting the pressure relief valve after performance testing, under constant speed operation, what was the flow rate through the main pressure relief valve at churn? ❑ No flow ❑ Weeping flow ❑ More than weeping flow ❑ Substantial flow ❑ N/A
What was the fire pump discharge pressure?_____ psi.
H. After resetting the pressure relief valve after performance testing, under constant speed operation, at what flow rate did the pressure relief valve substantially close?_____ gpm. What was the fire pump discharge pressure when the pressure relief valve was substantially closed? _____ psi.
I. Is the maximum discharge pressure adjusted for elevation, and with the pressure relief operational, less than the pressure rating of the system components for elevation? ❑ Yes ❑ No ❑ N/A

VIII. Controller Test

A. Did the pump start at least 6 times from automatic sources? ..... ❑ Yes ❑ No ❑ N/A
B. Was each automatic starting feature tested at least once? ..... ❑ Yes ❑ No ❑ N/A
C. Did the pump start at least 6 times manually? ..... ❑ Yes ❑ No ❑ N/A
D. Was the pump run for at least 5 minutes during each of the operations in Parts A, B, and C above? ..... ❑ Yes ❑ No ❑ N/A
(Note: An engine driver is not required to run for 5 minutes at full speed between successive starts until the cumulative cranking time of successive starts reaches 45 seconds.)
E. Were the starting operations divided between both sets of batteries for engine-driven controllers? ..... ❑ Yes ❑ No ❑ N/A



F. Were both ECMs tested if supported? ❑ Yes ❑ No ❑ N/A
G. Was the engine tested and rpm set on both ECMs at rated flow and full load? ❑ Yes ❑ No ❑ N/A
H. Were all alarm functions including ECM alarms for fuel injection failure, low fuel pressure, and any primary sensor failure tested at the engine? ❑ Yes ❑ No ❑ N/A
I. Electric Driven Pump Controllers
1. Were all overcurrent protective devices (including the controller circuit breaker) selected, sized, and set in accordance with NFPA 20? ❑ Yes ❑ No ❑ N/A
2. Was the fire pump started at least once from each power service and run for at least 5 minutes? ❑ Yes ❑ No ❑ N/A
3. Upon simulation of a power failure, while the pump is operating at peak load, did the transfer switch transfer from the normal to the emergency source without opening overcurrent protection devices on either line? ❑ Yes ❑ No ❑ N/A
4. When normal power was restored, did retransfer from emergency to normal power occur without overcurrent protection devices opening on either line? ❑ Yes ❑ No ❑ N/A
5. Were at least half of the automatic and manual starts required by Parts A and C performed with the pump connected to the alternate source? ❑ Yes ❑ No ❑ N/A
J. Were all signal conditions simulated demonstrating satisfactory operation? ❑ Yes ❑ No ❑ N/A
K. Did the pump run for at least 1 hour during the tests? ❑ Yes ❑ No ❑ N/A
NOTE: Run time includes all time the driver was turning the impeller — i.e., no-flow and flow conditions.

IX. Water Storage Tank ❑ Yes ❑ No
A. Tank capacity _____ gallons, height _____ ft, diameter _____ ft
B. Break tank ❑ Yes ❑ No ❑ N/A Required break tank fill rate _____ gpm ❑ N/A
C. Did refill rate maintain tank level when flowing 150% of rated capacity? ❑ Yes ❑ No ❑ N/A
D. A water refill rate of _____ gpm was: ❑ field verified by flowing _____ gpm through the fire pump with a starting water level of _____ ft _____ in. and an ending water level of _____ ft _____ in. after flowing for _____ minutes, ❑ field verified by raising the water level from _____ ft _____ in. to _____ ft _____ in. in _____ minutes, ❑ field verified by other means (specify) _____
E. Was the automatic refill assembly operated a minimum of 5 times? ❑ Yes ❑ No ❑ N/A

X. Test Evaluation
A. Did the pump performance equal that indicated on the manufacturer's certified shop test under all load conditions? ❑ Yes ❑ No
B. Did the pump discharge equal or exceed the maximum fire protection system demand? ❑ Yes ❑ No
C. Did the pump installation and performance meet the requirements of NFPA 20? ❑ Yes ❑ No

XI. Tester Information
Tester: _____
Company: _____
Company address: _____

I state that the information on this form is correct at the time and place of my test, and that all equipment tested was left in operational condition upon completion of this test except as noted in the comments section below.
Signature of tester: _____ Date: _____ License or certification number if applicable: _____

XII. Comments *(Any "No" answers, test failures, or other problems must be explained — use additional sheets if necessary.)*

 (NFPA 20, p. 4 of 4)

Figure A.14.2.6.3(b) 1000 gpm at 100 psi Fire Pump Acceptance Test — Constant Speed Operation.

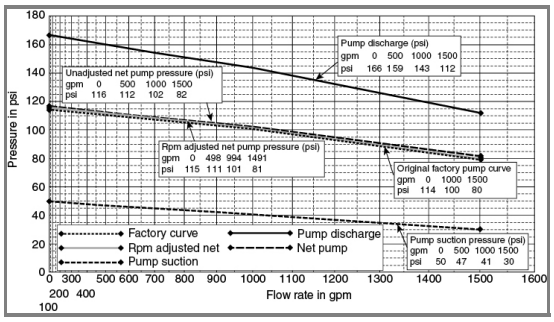


Figure A.14.2.6.3(c) Variable Speed Fire Pump Acceptance Test — Variable Speed Operation 1000 gpm at 100 psi Fire Pump.

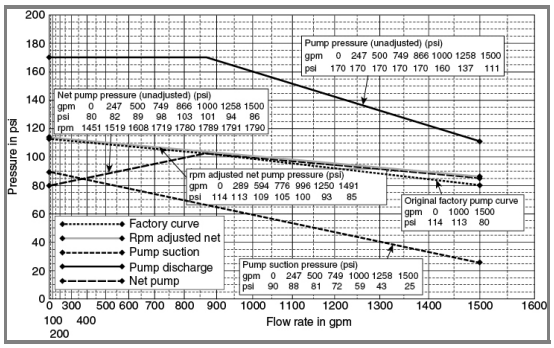
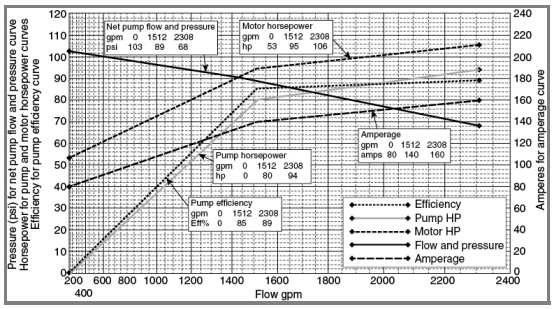


Figure A.14.2.6.3(d) Horsepower and Amperage Sample Curve — Underperforming 1500 gpm at 105 psi Fire Pump.



14.2.6.3.1

The fire pump shall perform at minimum, rated, and peak loads without objectionable overheating of any component.

14.2.6.3.2*

Vibrations of the fire pump assembly shall not be of a magnitude to pose potential damage to any fire pump component.

14.2.6.3.3

The minimum, rated, and peak loads of the fire pump shall be determined by controlling the quantity of water discharged through approved test devices.

14.2.6.3.3.1

Where simultaneous operation of multiple pumps is possible or required as part of a system design, the acceptance test shall include a flow test of all pumps operating simultaneously.

14.2.6.3.3.2

The quantity of water discharging from the fire pump assembly shall be determined and stabilized.

14.2.6.3.3.3

Immediately thereafter, the operating conditions of the fire pump and driver shall be measured.

14.2.6.3.4

Where the maximum flow available from the water supply cannot provide a flow of 150 percent of the rated flow of the pump, the fire pump shall be operated at the greater of 100 percent of rated flow or the maximum flow demand of the fire protection system(s) maximum allowable discharge to determine its acceptance.

14.2.6.3.4.1

This reduced capacity shall constitute an acceptable test, provided that the pump discharge exceeds the fire protection system design and flow rate.

14.2.6.3.5

Where the suction to the fire pump is from a break tank, the tank refill rate shall be tested and recorded.

14.2.6.3.5.1

The refill device shall be operated a minimum of five times.

14.2.6.3.6* Water Level Detection.

14.2.6.3.6.1

Water level detection shall be required for all vertical turbine pumps installed in wells to determine the water level available at the shutoff and the 100 percent and 150 percent flow points, to determine if the pump is operating within its design conditions.

14.2.6.3.6.2

The distance between the water level and the discharge flange shall be used to determine the net discharge pressure of the pump to prove the pump's performance.

14.2.6.4 Variable Speed Pumps.

14.2.6.4.1*

Variable speed pumps shall be tested at no-flow, 25 percent, 50 percent, 75 percent, 100 percent, 125 percent, and 150 percent of rated load in the variable speed mode.

14.2.6.4.1.1

Variable speed pumps shall also be tested at minimum, rated, and peak loads, with the fire pump operating at rated speed.

14.2.6.4.2

The fire protection system shall be isolated and the pressure relief valve closed for the rated speed tests required in 14.2.6.4.1.1.

14.2.6.4.3

The fire protection system shall be open and the relief valve set for the variable speed tests required in 14.2.6.4.1.

14.2.6.5 Multistage Multiport Pumps.

Each discharge outlet on a multistage multiport fire pump shall be tested in accordance with this standard.

~~**14.2.6.6** Measurement Procedure.~~

~~**14.2.6.6.1**~~

~~The quantity of water discharging from the fire pump assembly shall be determined and stabilized.~~

~~**14.2.6.6.2**~~

~~Immediately thereafter, the operating conditions of the fire pump and driver shall be measured.~~

14.2.6.6 Positive Displacement Pumps.

14.2.6.6.1

The pump flow for positive displacement pumps shall be tested and determined to meet the specified rated performance criteria where only one performance point is required to establish positive displacement pump acceptability.

14.2.6.6.2

The pump flow test for positive displacement pumps shall be accomplished using a flowmeter or orifice plate installed in a test loop back to the supply tank, to the inlet side of a positive displacement water pump, or to drain.

14.2.6.6.3

The flowmeter reading or discharge pressure shall be both recorded and shall be in accordance with the pump manufacturer's flow performance data.

14.2.6.6.4

If orifice plates are used, the orifice size and corresponding discharge pressure to be maintained on the upstream side of the orifice plate shall be made available to the authority having jurisdiction.

14.2.6.6.5 Flow Rates.

~~Flow rates shall be as specified while operating at the system design pressure. Tests shall be performed in accordance with ANSI/HI 3.6, *Rotary Pump Tests* .~~

14.2.6.6.5.1

Flow rates shall be as specified while operating at the system design pressure.

14.2.6.6.5.2

Tests shall be performed in accordance with ANSI/HI 3.6, *Rotary Pump Tests*.

14.2.6.6.6 Testing with Water.

~~**14.2.6.6.7**~~

~~Positive displacement pumps intended to pump liquids other than water shall be permitted to be tested with water; however, the pump performance will be affected, and manufacturer's calculations shall be provided showing the difference in viscosity between water and the system liquid.~~

14.2.6.6.6.1

Positive displacement pumps intended to pump liquids other than water shall be permitted to be tested with water. ;

14.2.6.6.6.2

~~pump~~ Pump performance will be affected by testing with water , and manufacturer's calculations shall be provided showing the difference in viscosity between water and the system liquid.

14.2.6.6.7

For water mist positive displacement pumping units, each pump shall be operated manually a minimum of six times during the acceptance test.

14.2.6.6.8

For water mist positive displacement pumping units, each of the required automatic operations shall operate all pumps, except as provided in 14.2.6.6.9 and 14.2.6.6.10.

14.2.6.6.9

Where redundant pumps are provided, each of the automatic operations shall operate the number of pumps required to meet system demand.

14.2.6.6.10

Where redundant pumps are provided, each pump shall operate for a minimum of three automatic operations.

Detail SR-36

14.2.6.6.11 Automatic Activation Test.

14.2.6.6.11.1

For water mist positive displacement pumping units, the automatic activation test shall be carried out by using a test connection that simulates the smallest system nozzle, in the hydraulically most remote area, discharged from maintenance pressure/standby pressure or equal-sized test orifice in the pump unit test line.

14.2.6.6.11.2

The pumping unit shall achieve the system design discharge pressure within the time specified in 8.4.9 .

14.2.6.7 Electric-Motor-Driven Units.

14.2.6.7.1

For electric motors operating at rated voltage and frequency, the ampere demand on each phase shall not exceed the product of the full-load ampere rating times the allowable service factor as stamped on the motor nameplate.

14.2.6.7.2*

For electric motors operating under varying voltage, the product of the actual voltage and current demand on each phase shall not exceed the product of the rated voltage and rated full-load current times the allowable service factor.

14.2.6.7.3

The voltage at the motor contactor output lugs shall not vary more than 5 percent below or 10 percent above rated (nameplate) voltage during the test. *(See Section 9.4.)*

14.2.6.8 Engine-Driven Units.

14.2.6.8.1

When dry charge batteries have been supplied, electrolyte shall be added to the batteries a minimum of 24 hours prior to the time the engine is to be started and the batteries given a conditioning charge.

14.2.6.8.2

Engine-driven units shall not show signs of overload or stress.

14.2.6.8.3

The governor of such units shall be set at the time of the test to ~~properly~~ regulate the engine speed at rated pump speed. *(See 11.2.4.1.)*

14.2.6.8.4

Engines equipped with a variable speed control shall have the variable speed control device nonfunctioning when the governor field adjustment in 11.2.4.1 is set and secured.

14.2.6.9 Steam-Turbine-Driven Units.

The steam turbine shall maintain its speed within the limits specified in 13.2.2.

14.2.6.10 Right Angle Gear Drive Units.

The gear drive assembly shall operate without excessive objectionable noise, vibration, or heating.

14.2.6.11 Loads Start Test.

The fire pump unit shall be started and brought up to rated speed without interruption under the conditions of a discharge equal to peak load.

14.2.6.12* Phase Reversal Test.

For electric motors, a test shall be performed to ensure that there is not a phase reversal condition in either the normal power supply configuration or from the alternate power supply (where provided).

Supplemental Information

File Name	Description	Approved
NFPA_20-_SR-37_Re-Org_14.2.6.docx	For staff use	

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 16:29:02 EDT 2020

Committee Statement

Committee Statement: Section 14.2.6 reorganized to provide clarity on pump test procedures.

Response Message: SR-37-NFPA 20-2020

Second Revision No. 33-NFPA 20-2020 [New Section after 14.2.7.3]

14.2.7.3.1

When operating a variable speed pump in accordance with 14.2.7.2 , a minimum run time for each operation is not required.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Thu Oct 15 17:43:14 EDT 2020

Committee Statement

Committee Statement: When operating in the variable speed mode, the minimum run time is not needed since motor heating is not an issue for repetitive starting.

Response Message: SR-33-NFPA 20-2020

Public Comment No. 37-NFPA 20-2020 [Section No. 14.2.6.4.3]

Second Revision No. 59-NFPA 20-2020 [Section No. A.3.3.79.2]

A.3.3.78.2 Self-Regulating Variable Speed Fire Pump Unit.

The self-regulating variable speed fire pump unit has onboard factory embedded logic that enables it to know the suction pressure, discharge pressure, and power draw, and to calculate the flow and net pressures from that information, and then communicate the information. All accessories required to perform the discharge pressure limiting and net pressure limiting functions by pump speed regulation are integrated in the pump unit.

Each self-regulating variable speed fire pump unit should include a bypass that can operate in automatic mode and via a manual mechanical operator that can be used to bypass the ~~adjustable speed drive (ASD)~~ variable frequency drive (VFD) in order to apply power directly to the motor.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Oct 28 11:06:26 EDT 2020

Committee Statement

Committee Statement: The terms Variable Frequency and Variable Speed are used interchangeably in this document and a more careful evaluation and alignment needs to occur in the next revision cycle. The committee decided to revert back to the 2019 language on this matter so that a more thorough approach can be taken. In this case, since other changes were made in the First Draft in this section, it is confirmed that the committee is keeping all changes with the exception of those resulting from FR3.

Response Message: SR-59-NFPA 20-2020

Second Revision No. 63-NFPA 20-2020 [Section No. A.11.4.1.2]

A.11.4.1.3.1.1

The quantity 1 gal per hp (5.07 L per kW) is equivalent to 1 pint per hp (0.634 L per kW) per hour for 8 hours. Where prompt replenishment of fuel supply is unlikely, a reserve supply should be provided along with facilities for transfer to the main tanks.

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Wed Nov 04 08:04:10 EST 2020

Committee Statement

Committee Statement: The section has been renumbered for editorial consistency with the new section A.11.4.1.3.1.1.

Response Message: SR-63-NFPA 20-2020

Second Revision No. 35-NFPA 20-2020 [Section No. C.9.2.10.1]

C.9.2.10.1

Table C.9.2.10.1(a) through Table C.9.2.10.1(m) are recommended Modbus register usage for controllers.

Figure C.9.2.10.1 is an example of a pump room device identification.

Figure C.9.2.10.1 Example of a Pump Room Device Identification.

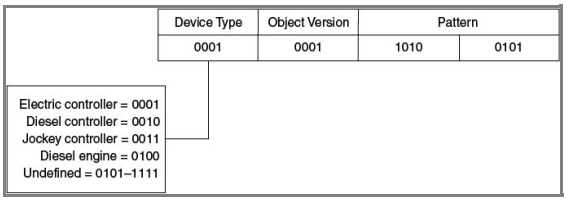


Table C.9.2.10.1(a) Pump Room Data Storage Structure

Device	Modbus Registers	Number of Registers	NFPA 20-2019 Table
Pump room data register assignments (42001–42999)			
Electric controller	42001–42280	280	Table C.9.2.10.1(b)
Diesel controller	42001–42280	280	Table C.9.2.10.1(c)
Undefined	42281–42290	10	
Jockey controller	42291–42420	130	Table C.9.2.10.1(d)
Undefined	42421–42430	10	
Electric event log	42431–42460	30	Table C.9.2.10.1(e)
Diesel event log	42431–42460	30	Table C.9.2.10.1(f)
Jockey event log	42461–42490	30	Table C.9.2.10.1(g)
Event log IDs			Tables C.9.2.10.1(h), (i), (j)
Undefined	42491–42500	10	
Pump performance curves	42501–42920	420	Table C.9.2.10.1(k)
Pump performance parameters			Table C.9.2.10.1(l)
Undefined	42921–42999	80	
Pump room data register assignments (43001–43999)			
Diesel engine	43001–43200	200	Table C.9.2.10.1(m)
Undefined	43201–43999	800	

Note: Electric and diesel controller data and event logs share the same registers.

Table C.9.2.10.1(b) Electric Fire Pump Controller

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scalin and Notes
		Pump Room Device					
42001		Pump room device ID			RO		See No 2
42002–42010		Undefined			RO		
42011–42020		Manufacturer name			RO	ASCII Text	20 charact

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scalin and Notes
42021–42030		Basic model			RO	ASCII Text	20 charact
42031–42040		Controller type			RO	ASCII Text	20 charact
42041–42050		Serial number			RO	ASCII Text	20 charact
42051–42060		Software version			RO	ASCII Text	20 charact
		Time and Date Stamp					
42061–42064		Date and time	milliseconds		RO	64-bit binary number	See No 3
42065–42070		Undefined			RO		
		Alarms					
42071	D0	AC power available			RO	Boolean	See No 4
	D1	Audible alarm (common alarm)			RO	Bool	
	D2	Phase failure alarm			RO	Bool	
	D3	Phase reversal alarm			RO	Bool	
	D4	Motor running alarm			RO	Bool	
	D5	Motor single phasing alarm			RO	Bool	
	D6	Motor overload alarm			RO	Bool	
	D7	Failure to start alarm			RO	Bool	
	D8	Circuit breaker tripped alarm			RO	Bool	
	D9	AC line under voltage alarm			RO	Bool	
	D10	AC line over voltage alarm			RO	Bool	
	D11	AC line under frequency alarm			RO	Bool	
	D12	AC line over frequency alarm			RO	Bool	
	D13	Low pump room temperature alarm		X	RO	Bool	
	D14	~~Undefined~~ Pump trouble group alarm			RO	Bool	

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scalin and Notes
	D15	~~Undefined~~ System trouble alarm			RO	Bool	
42072	D0	Pressure start demand (low pressure)			RO	Bool	
	D1	Remote start demand			RO	Bool	
	D2	Deluge start demand			RO	Bool	
	D3	Weekly test start demand			RO	Bool	
	D4	Local start pushbutton demand			RO	Bool	
	D5	Mechanical operator start demand (emergency run)			RO	Bool	
	D6	Lockout active (interlock)			RO	Bool	
	D7	Low discharge pressure alarm		X	RO	Bool	
	D8	Low suction pressure alarm		X	RO	Bool	
	D9	Low suction pressure shutdown active		X	RO	Bool	
	D10	System overpressure alarm			RO	Bool	
	D11	Pressure transducer fault			RO	Bool	
	D12	Pressure transducer test ok			RO	Bool	
	D13	Weekly/monthly test setup error			RO	Bool	
	D14	Weekly test demand active			RO	Bool	
	D15	Undefined			RO	Bool	
42073	D0	Transfer switch in normal position			RO	Bool	
	D1	Transfer switch in emergency position			RO	Bool	
	D2	Transfer switch normal power available		X	RO	Bool	

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scalin and Notes
	D3	Transfer switch emergency power available		X	RO	Bool	
	D4	Emergency isolation switch open alarm			RO	Bool	
	D5	Generator engine start signal			RO	Bool	
	D6	Load shed active		X	RO	Bool	
	D7	Undefined			RO	Bool	
	D8	ASD ready			RO	Bool	
	D9	ASD failure alarm			RO	Bool	
	D10	ASD forward command active		X	RO	Bool	
	D11	ASD reverse command active		X	RO	Bool	
	D12	Controller in bypass, soft start/ASD only			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42074	D0	Minimum run timing active			RO	Bool	
	D1	Minimum run timer timed out			RO	Bool	
	D2	Sequential delay timing active			RO	Bool	
	D3	Acceleration delay timing active		X	RO	Bool	
	D4	High zone delay timing active		X	RO	Bool	
	D5	Restart delay timing active		X	RO	Bool	
	D6	Locked-rotor trip timing active		X	RO	Bool	
	D7	Load shed delay timing active		X	RO	Bool	
	D8	Undefined			RO	Bool	
	D9	Undefined			RO	Bool	
	D10	Undefined			RO	Bool	
	D11	Undefined			RO	Bool	
	D12	Undefined			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scalin and Notes
	D15	Undefined			RO	Bool	
42075–42090		Undefined			RO		
		Dynamic Real-time Data					
42091		AC volts lines 1–2	V		RO	0–60000	0.1·Raw
42092		AC volts lines 2–3	V		RO	0–60000	0.1·Raw
42093		AC volts lines 3–1	V		RO	0–60000	0.1·Raw
42094		AC amps line 1	A		RO	0–50000	0.1·Raw
42095		AC amps line 2	A		RO	0–50000	0.1·Raw
42096		AC amps line 3	A		RO	0–50000	0.1·Raw
42097		Line frequency	Hz		RO	0–1000	0.1·Raw
42098–42100		Undefined					
42101		Pump discharge pressure (system pressure)	psi/bar/kPa		RO	0–6000	0.1·Raw
42102		Suction pressure	psi/bar/kPa	X	RO	0–6000	0.1·Raw
42103		Net pressure = system − suction	psi/bar/kPa	X	RO	0–6000	0.1·Raw
42104		System pressure at pump shutdown	psi/bar/kPa		RO	0–10000	0.1·Raw
42105		Flow	gpm/L/min	X	RO	0–50000	
42106		Motor speed	rpm	X	RO	0–4000	
42107		ASD motor speed	Hz	X	RO	0–1000	0.1·Raw
42108–42110		Undefined					
42111		Water temperature, pump casing	°F/°C	X	RO	0–1000	0.1·Raw
42112		Pump room temperature	°F/°C	X	RO	0–1000	0.1·Raw
42113–42114		Storage tank level	gal	X	RO	0–10,000,0000	
42115–42130		Undefined					
		Controller Settings					
42131		Pressure start	psi/bar/kPa		RO	0–600	
42132		Pressure stop	psi/bar/kPa		RO	0–600	
42133		Manual stop only			RO	0 = Automatic, 1 = Manual stop only	
42134		Minimum run timer (running period timer)	sec		RO	0–6000	
42135		Sequential timer	sec		RO	0–6000	

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scalin and Notes
42136		Weekly test timer, day	day		RO	0–6, Sunday = 0	
42137		Weekly test timer, hr	hr			0–23	
42138		Weekly test timer, min	min			0–59	
42139		Pressure units			RO	0 = psi, 1 = bar, 2 = kPa	
42140		Flow units		X	RO	0 = gpm, 1 = L/min	
42141		Temperature units		X	RO	0 = °F, 1 = °C	
42142		Weekly test time	min		RO	0–59	
~~42142~~ 42143 –42150		Undefined					
		Historical Data					
42151		Maximum starting current line A	A	X	RO	0–30000	0.1·Raw
42152		Maximum starting current line B	A	X	RO	0–30000	0.1·Raw
42153		Maximum starting current line C	A	X	RO	0–30000	0.1·Raw
42154		Maximum run current line A	A	X	RO	0–50000	0.1·Raw
42155		Maximum run current line B	A	X	RO	0–50000	0.1·Raw
42156		Maximum run current line C	A	X	RO	0–50000	0.1·Raw
42157		Minimum ac volts idle lines 1–2	V	X	RO	0–1000	
42158		Minimum ac volts idle lines 2–3	V	X	RO	0–1000	
42159		Minimum ac volts idle lines 3–1	V	X	RO	0–1000	
42160		Maximum ac volts idle lines 1–2	V	X	RO	0–1000	
42161		Maximum ac volts idle lines 2–3	V	X	RO	0–1000	
42162		Maximum ac volts idle lines 3–1	V	X	RO	0–1000	
42163		Minimum ac volts starting lines 1–2	V	X	RO	0–60000	0.1·Raw
42164		Minimum ac volts starting lines 2–3	V	X	RO	0–60000	0.1·Raw
42165		Minimum ac volts starting lines 3–1	V	X	RO	0–60000	0.1·Raw
42166		Minimum ac volts running lines 1–2	V	X	RO	0–60000	0.1·Raw

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scalin and Note
42167		Minimum ac volts running lines 2–3	V	X	RO	0–60000	0.1·Raw
42168		Minimum ac volts running lines 3–1	V	X	RO	0–60000	0.1·Raw
42169		Maximum ac volts running lines 1–2	V	X	RO	0–60000	0.1·Raw
42170		Maximum ac volts running lines 2–3	V	X	RO	0–60000	0.1·Raw
42171		Maximum ac volts running lines 3–1	V	X	RO	0–60000	0.1·Raw
42172		Minimum frequency	Hz	X	RO	0–1000	0.1·Raw
42173		Maximum frequency	Hz	X	RO	0–1000	0.1·Raw
42174		Last locked rotor ac amps line 1	A	X	RO	0–50000	
42175		Last locked rotor ac amps line 2	A	X	RO	0–50000	
42176		Last locked rotor ac amps line 3	A	X	RO	0–50000	
42177–42178		Undefined					
42179		Minimum system pressure	psi/bar/kPa	X	RO	0–6000	0.1·Raw
42180		Maximum system pressure	psi/bar/kPa	X	RO	0–6000	0.1·Raw
42181		Counter, number of starts			RO	0–10000	
42182		Counter, number of calls to start			RO	0–10000	
42183		Total run time, hours	hr		RO	0–59999	
42184		Total run time, minutes	min		RO	0–59	
42185		Total run time, seconds	sec		RO	0–59	
42186		Pump last run time, ~~minutes~~ hours	~~min~~ hr		RO	0–59	
42187		Pump last run time, ~~seconds~~ minutes	~~sec~~ min		RO	0–59	
42188		Total controller power on time, hours	hr		RO	0–59999	
42189		Total controller power on time, minutes	min		RO	0–59	

Modbus Register (42001–42290)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scalin and Note
42190		Total controller power on time, seconds	sec		RO	0–59	
42191		Hours since last run	hr		RO	0–59999	
42192		Hours since last solenoid drain valve test	hr		RO	0–59999	
42193–42196		Last pump start, date and time	milliseconds		RO	64-bit binary number	See Not 3
42197–42202		Last phase failure, date and time	milliseconds		RO	64-bit binary number	See Not 3
42203–42206		Last phase reversal, date and time	milliseconds		RO	64-bit binary number	See Not 3
42207–42210		Last locked rotor trip, date and time	milliseconds		RO	64-bit binary number	See Not 3
42211–42230		Undefined					
42231–42280		Manufacturer specific				50 registers	
42281–42290		Undefined					

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times*. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Table C.9.2.10.1(c) Diesel Fire Pump Controller

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
		Pump Room Device					
42001		Pump room device ID			RO		See Not 2
42002–42010		Undefined			RO		
42011–42020		Manufacturer name			RO	ASCII Text	20 character
42021–42030		Basic model			RO	ASCII Text	20 character
42031–42040		Controller type			RO	ASCII Text	20 character
42041–42050		Serial number			RO	ASCII Text	20 character

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
42051–42060		Software version			RO	ASCII Text	20 character
		Time and Date Stamp					
42061–-42064		Date and time	milliseconds		RO	64-bit binary number	See Note 3
42065–42070		Undefined			RO		
		Alarms					
42071	D0	AC power fail alarm			RO	Boolean	
	D1	Audible alarm (common)			RO	Bool	
	D2	Control switch in auto			RO	Bool	
	D3	Control switch in manual			RO	Bool	
	D4	Engine running			RO	Bool	
	D5	Crank on battery #1 active			RO	Bool	
	D6	Crank on battery #2 active			RO	Bool	
	D7	Crank resting active			RO	Bool	
	D8	Failure-to-start alarm			RO	Bool	
	D9	System trouble #1 alarm			RO	Bool	
	D10	System trouble #2 alarm			RO	Bool	
	D11	AC power fail start alarm			RO	Bool	
	D12	Start contactor #1 fail alarm			RO	Bool	
	D13	Start contactor #2 fail alarm			RO	Bool	
	D14	Pump trouble group alarm			RO	Bool	
	D15	~~Undefined~~ System trouble alarm			RO	Bool	
42072	D0	Pressure start demand (low pressure)			RO	Bool	
	D1	Remote start demand			RO	Bool	
	D2	Deluge start demand			RO	Bool	

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
	D3	Weekly test start demand			RO	Bool	
	D4	Lockout active (interlock)			RO	Bool	
	D5	Low discharge pressure alarm			RO	Bool	
	D6	Low suction pressure alarm			RO	Bool	
	D7	Low suction pressure shutdown active			RO	Bool	
	D8	System overpressure alarm			RO	Bool	
	D9	Pressure transducer fault			RO	Bool	
	D10	Pressure transducer test OK			RO	Bool	
	D11	Weekly/monthly test setup error			RO	Bool	
	D12	Weekly test demand active			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42073	D0	Battery #1 OK			RO	Bool	
	D1	Battery #2 OK			RO	Bool	
	D2	Battery #1 failure alarm			RO	Bool	
	D3	Battery #2 failure alarm			RO	Bool	
	D4	Charger #1 fail alarm			RO	Bool	
	D5	Charger #2 fail alarm			RO	Bool	
	D6	Battery #1 in equalize		X	RO	Bool	
	D7	Battery #2 in equalize		X	RO	Bool	
	D8	Battery #1 over voltage alarm			RO	Bool	
	D9	Battery #2 over voltage alarm			RO	Bool	
	D10	Undefined			RO	Bool	
	D11	Undefined			RO	Bool	

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scaling and Notes
	D12	Undefined			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42074	D0	Overspeed alarm			RO	Bool	
	D1	High engine coolant water temp alarm			RO	Bool	
	D2	Low oil pressure alarm			RO	Bool	
	D3	Low pump room temperature alarm		X	RO	Bool	
	D4	High reservoir level alarm		X	RO	Bool	
	D5	Low reservoir level alarm		X	RO	Bool	
	D6	Fuel tank level low alarm			RO	Bool	
	D7	Fuel tank level high alarm		X	RO	Bool	
	D8	Fuel tank spill alarm			RO	Bool	
	D9	Fuel maintenance needed			RO	Bool	
	D10	Relief valve open			RO	Bool	
	D11	Low air pressure alarm (air-starting engines)			RO	Bool	
	D12	Undefined			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42075	D0	Electronic control module switch (ECMS) engine terminal 301			RO	Bool	
	D1	Fuel injection malfunction (FIM) engine terminal 302			RO	Bool	
	D2	Electronic control module warning (ECMW) engine terminal 303			RO	Bool	

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
	D3	Electronic control module failure (ECMF) engine terminal 304			RO	Bool	
	D4	Low suction pressure engine option (LSP) engine terminal 305			RO	Bool	
	D5	High raw water temperature (HRT) engine terminal 310			RO	Bool	
	D6	Low raw water flow (LRF) engine terminal 311			RO	Bool	
	D7	Low engine temperature (LET) engine terminal 312			RO	Bool	
	D8	Undefined			RO	Bool	
	D9	Undefined			RO	Bool	
	D10	Undefined			RO	Bool	
	D11	Undefined			RO	Bool	
	D12	Undefined			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42076	D0	Minimum run timing active			RO	Bool	
	D1	Minimum run timed out			RO	Bool	
	D2	Sequence delay timing active			RO	Bool	
	D3	High zone delay timing active		X	RO	Bool	
	D4	Power fail start delay timing active		X	RO	Bool	
	D5	Undefined			RO	Bool	
	D6	Undefined			RO	Bool	
	D7	Undefined			RO	Bool	
	D8	Undefined			RO	Bool	
	D9	Undefined			RO	Bool	
	D10	Undefined			RO	Bool	
	D11	Undefined			RO	Bool	

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scaling and Notes
	D12	Undefined			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42077–42090		Undefined					
		Dynamic Real-Time Data					
42091		Battery #1 volts	V		RO	0–5000	0.01·Raw
42092		Battery #2 volts	V		RO	0–5000	0.01·Raw
42093		Charger 1 ac power input	V		RO	0–3000	
42094		Battery #1 amps	A		RO	0–5000	0.01·Raw
42095		Battery #2 amps	A		RO	0–5000	0.01·Raw
42096		Charger 2 ac power input	V		RO	0–3000	
40097–42100		Undefined					
42101		Pump discharge pressure (system pressure)	psi/bar/kPa		RO	0–6000	0.1·Raw
42102		Suction pressure	psi/bar/kPa	X	RO	0–6000	0.1·Raw
42103		Net pressure = system − suction	psi/bar/kPa	X	RO	0–6000	0.1·Raw
42104		System pressure at pump shutdown	psi/bar/kPa		RO	0–1000	0.1·Raw
42105		Flow	gpm/L/min	X		0–50000	
42106		Engine speed	rpm	X		0–4000	
42107–42110		Undefined					
42111		Water temperature, pump casing	°F/°C	X	RO	0–1000	0.1·Raw
42112		Pump room temperature	°F/°C	X	RO	0–1000	0.1·Raw
42113–42114		Storage tank level	gal	X	RO	0–10,000,000	
42115		Fuel tank level	gal	X	RO	0–2000	
42116–42130		Undefined					
		Controller Settings					
42131		Pressure start	psi/bar/kPa		RO	0–600	
42132		Pressure stop	psi/bar/kPa		RO	0–600	
42133		Manual stop only			RO	0 = Automatic, 1 = Manual stop only	

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
42134		Minimum run timer (running period timer)	sec		RO	0–6000	
42135		Sequential timer	sec		RO	0–6000	
42136		Weekly test timer, day	day		RO	0–6, Sunday = 0	
42137		Weekly test timer, hr	hr			0–23	
42138		Weekly test timer, min	min			0–59	
42139		Pressure units			RO	0 = psi, 1 = bar, 2 = kPa	
42140		Flow units		X	RO	0 = gpm, 1 = L/min	
42141		Temperature units		X	RO	0 = °F, 1 = °C	
42142		Weekly test time	min		RO	0–59	
~~42142~~ 42143 –42150		Undefined					
		Historical Data					
42151		Minimum battery #1 voltage	V		RO	0–5000	0.01·Raw
42152		Minimum battery #2 voltage	V		RO	0–5000	0.01·Raw
42153		Maximum battery #1 voltage	V		RO	0–5000	0.01·Raw
42154		Maximum battery #2 voltage	V		RO	0–5000	0.01·Raw
42155		Minimum battery #1 amps	A		RO	0–1500	0.1·Raw
42156		Minimum battery #2 amps	A		RO	0–1500	0.1·Raw
42157		Maximum battery #1 amps	A		RO	0–1500	0.1·Raw
42158		Maximum battery #2 amps	A		RO	0–1500	0.1·Raw
42159–42178		Undefined					
42179		Minimum system pressure	psi/bar/kPa		RO	0–6000	0.1·Raw
42180		Maximum system pressure	psi/bar/kPa		RO	0–6000	0.1·Raw
42181		Counter, number of starts			RO	0–10000	
42182		Counter, number of calls to start			RO	0–10000	
42183		Total run time, hr	hr		RO	0–59999	
42184		Total run time, min	min		RO	0–59	

Modbus Register (42001–42280)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
42185		Total run time, sec	sec		RO	0–59	
42186		Pump last run time, ~~min~~ hr	~~min~~ hr		RO	0–59	
42187		Pump last run time, ~~sec~~ min	~~sec~~ min		RO	0–59	
42188		Total controller power on time, hr	hr		RO	0–59999	
42189		Total controller power on time, min	min		RO	0–59	
42190		Total controller power on time, sec	sec		RO	0–59	
42191		Hours since last run	hr		RO	0–59999	
42192		Hours since last solenoid drain valve test	hr		RO	0–59999	
42193–42196		Last engine start, date and time	milliseconds		RO	64-bit binary number	See Note 3
42197–42200		Last engine overspeed, date and time	milliseconds		RO	64-bit binary number	See Note 3
42201–42204		Last charger failure, date and time	milliseconds		RO	64-bit binary number	See Note 3
42205–42208		Last battery trouble, date and time	milliseconds		RO	64-bit binary number	See Note 3
42209–42212		Last low fuel level, date and time	milliseconds		RO	64-bit binary number	See Note 3
42213–42216		Last engine high temperature, date and time	milliseconds		RO	64-bit binary number	See Note 3
42217–42220		Last engine low pressure, date and time	milliseconds		RO	64-bit binary number	See Note 3
42221–42230		Undefined					
42231–42280		Manufacturer specific				50 registers	
42281–42290		Undefined					

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times*. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Table C.9.2.10.1(d) Jockey Pump Controller

Modbus Register (42291–42430)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
		Pump Room Device					
42291		Pump room device ID			RO		See Note 2
42292–42300		Undefined			RO		
42301–42310		Manufacturer name			RO	ASCII Text	20 characters
42351–42320		Basic model			RO	ASCII Text	20 characters
42361–42330		Controller type			RO	ASCII Text	20 characters
42371–42340		Serial number			RO	ASCII Text	20 characters
42381–42350		Software version			RO	ASCII Text	20 characters
		Time and Date Stamp					
42351–42354		Date and time	milliseconds		RO	64-bit binary number	See Note 3
42355–42360		Undefined					
		Alarms					
42361	D0	Power available			RO	Boolean	
	D1	Pump running			RO	Bool	
	D2	Failure-to-start alarm			RO	Bool	
	D3	Common alarm			RO	Bool	
	D4	Undefined			RO	Bool	
	D5	Undefined			RO	Bool	
	D6	Undefined			RO	Bool	
	D7	Undefined			RO	Bool	
	D8	Undefined			RO	Bool	
	D9	Undefined			RO	Bool	
	D10	Undefined			RO	Bool	
	D11	Undefined			RO	Bool	
	D12	Undefined			RO	Bool	
	D13	Undefined			RO	Bool	
	D14	Undefined			RO	Bool	
	D15	Undefined			RO	Bool	
42362–42370		Undefined					
		Dynamic Real-Time Data					

Modbus Register (42291–42430)	Bit	Description	Units	Optional (X)	Write	Range *(See Note 1)*	Scaling and Notes
42371		Pump discharge pressure (system pressure)	psi/bar/kPa		RO	0–6000	0.1·Raw
42372–42380		Undefined					
		Controller Settings					
42381		Pressure start	psi/bar/kPa		RO	0–600	
42382		Pressure stop	psi/bar/kPa		RO	0–600	
42383		Main switch in auto			RO	1 = Switch in AUTO	
42384		Main switch in manual			RO	1 = Switch in MANUAL	
42385		Main switch in off			RO	1 = Switch in OFF	
42386		Pressure units			RO	0 = psi, 1 = bar, 2 = kPa	
42387–42390		Undefined					
		Historical Data					
42391		Counter, number of starts			RO	0–10000	
42392		Total jockey run time, hr	hr		RO	0–59999	
42393		Total jockey run time, min	min		RO	0–59	
42394–42400		Undefined					
42401–42420		Manufacturer specific				20 registers	
42421–42430		Undefined					

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times*. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Table C.9.2.10.1(e) Event Log Data Access — Electric Controller

Modbus Register (42431–42460)	Description	Units	Write	Range	Scaling and Notes
42431	Rewind event log oldest		RO		Read register to rewind
42432	Rewind event log 1 day ago		RO		Read register to rewind
42433	Rewind event log 7 days ago		RO		Read register to rewind

Modbus Register (42431–42460)	Description	Units	Write	Range	Scaling and Notes
42434	Rewind event log 30 days ago		RO		Read register to rewind
42435	Rewind event log 60 days ago		RO		Read register to rewind
42436	Rewind event log 90 days ago		RO		Read register to rewind
42437–42440	Undefined				
42441–42443	Date and time stamp	milliseconds	RO	64-bit binary number	See Note 2
42444	Event ID		RO	1–250	See ID Table C.9.2.10.1(h) Event ID = 0 is EOF
42445	Event value1	psi/bar/kPa	RO	0–6000	0.1·Raw
42446	Flags, event value1				
42447–42450	Undefined				
42451–42460	Manufacturer configurable			10 registers	

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times*. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Table C.9.2.10.1(f) Event Log Data Access — Diesel Controller

Modbus Register (42431–42460)	Description	Units	Write	Range	Scaling and Notes
42431	Rewind event log oldest		RO		Read register to rewind
42432	Rewind event log 1 day ago		RO		Read register to rewind
42433	Rewind event log 7 days ago		RO		Read register to rewind
42434	Rewind event log 30 days ago		RO		Read register to rewind
42435	Rewind event log 60 days ago		RO		Read register to rewind
42436	Rewind event log 90 days ago		RO		Read register to rewind
42437–42440	Undefined				
42441–42443	Date and time stamp	milliseconds	RO	64-bit binary number	See Note 2
42444	Event ID		RO	1–250	See ID Table C.9.2.10.1(i) Event ID = 0 is EOF

Modbus Register (42431–42460)	Description	Units	Write	Range	Scaling and Notes
42445	Event value1	psi/bar/kPa	RO	0–6000	0.1·Raw
42446	Flags, event value1				
42447–42450	Undefined				
42451–42460	Manufacturer configurable			10 registers	

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times*. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Table C.9.2.10.1(g) Event Log Data Access — Jockey Controller

Modbus Register (42461–42490)	Description	Units	Write	Range	Scaling and Notes
42461	Rewind event log oldest		RO		Read register to rewind
42462	Rewind event log 1 day ago		RO		Read register to rewind
42463	Rewind event log 7 days ago		RO		Read register to rewind
42464	Rewind event log 30 days ago		RO		Read register to rewind
42465	Rewind event log 60 days ago		RO		Read register to rewind
42466	Rewind event log 90 days ago		RO		Read register to rewind
42467–42470	Undefined				
42471–42473	Date and time stamp	milliseconds	RO	64-bit binary number	See Note 2
42474	Event ID		RO	1–250	See ID Table C.9.2.10.1(j) Event ID = 0 is EOF
42475	Event value1	psi/bar/kPa	RO	0–6000	0.1·Raw
42476	Flags, event value1				
42477–42480	Undefined				
42481–42490	Manufacturer configurable			10 registers	
42491–42500	Undefined				

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements*

and Interchange Formats — Information Interchange — Representation of Dates and Times. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Table C.9.2.10.1(h) Electric Event Messages

ID	Event Message
1	Pump Running
2	Pump Stopped
3	Fail to Start
4	Fail to Start Noted
5	Call to Start
6	Locked Rotor Trip
7	Rotor Trip Clear
8	Over Voltage
9	Over Frequency
10	Under Voltage
11	Under Frequency
12	Voltage Imbalance
13	Phase Failure
14	Phase Reversal
15	Current >320% FLA
16	Motor Overload
17	Nominal Voltage
18	Voltage Balanced
19	Nominal Frequency
20	Phase Nominal
21	Phase Sequence
22	Nominal Current
23	Motor Normal
24	Interlock On
25	Interlock Off
26	Deluge Open
27	Deluge Closed
28	Low Pressure
29	Normal Pressure
30	Manual Stop Button
31	Manual Stop Released
32	Power Transferred
33	Power Re-Transferred
34	Control Voltage OK
35	No Control Voltage
36	Load Disconnect
37	Load Reconnect
38	Local Start Input
39	Local Start Clear

ID	Event Message
40	Remote Start Input
41	Remote Start Clear
42	Emergency Run On
43	Emergency Run Off
44	Emergency Isolation Switch On
45	Emergency Isolation Switch Off
46	Soft Start Over Temp Bypass
47	Soft Start Over Temp Normal
48	Motor Start Checked
49	Pressure Fail
50	Pressure in Range
51	Pressure Log
52	Pressure Log Run
53	Database Clear
54	System Reset
55	Data Log Cleared
56	Low Suction Pressure
57	Suction Pressure OK
58	Reservoir Low
59	Reservoir OK
60	Low Pump Room Temp
61	Pump Room Temp OK
62	Pump Room Trouble
63	Pump Room Normal
64	Min Start Volts
65	Max Start Current
66	Load Shed
67	Load Restored
68	Weekly Test Running
69	Weekly Test Done
70	Parameters Reset
71	Passwords Reset
72	Low Suction Level
73	Suction Level OK
74	Automatic Start
75	Automatic Start Clear
76	Calibration Error
77	Calibration Error Cleared
78	Test In Progress
79	Test Completed
80	Jockey Pump Running
81	Jockey Pump Off

ID	Event Message
82	Jockey Pump Trouble
83	Jockey Pump OK
84	Emergency Stop
85	Emergency Stop Released
86	ASD Bypass
87	ASD Active
88	ASD Failure
89	ASD Failure Clear
90	System Overpressure
91	System Pressure OK
92	Weekly Test Due
93	Weekly Test Due Clear
94	Softstarter Fault
95	Softstarter Ok
96	ASD Ready
97	ASD Not Ready
98	Shunt Trip Normal
99	Shunt Trip Emergency
100	Flow Meter On
101	Flow Meter Off
102	Auto Start Input
103	Auto Start Input Off
104	Pressure Delta
105	Test Pushbutton Start
106	Test Failed
107	Test Override
108	Manual Stop Enabled
109	Manual Stop Disabled
110	Manual Pushbutton Start
111	Duty Pump
112	Standby Pump
113	Unit Available
114	Unit Not Available
115	Shutdown Activated
116	Shutdown Released
117	Relief Valve Open
118	Relief Valve Closed
119	Manual Test Input
120	Manual Test Clear
121	ASD Sleep (Power Off)
122	ASD Wakeup (Power On)
123	Pump Trouble Group

ID	Event Message
124	System Trouble
~~123~~ 125 –250	Undefined

Table C.9.2.10.1(i) Diesel Event Messages

ID	Event Message
1	Engine Running
2	Engine Stopped
3	Fail to Start
4	Fail to Start Noted
5	Call to Start
6	Interlock On
7	Interlock Off
8	Deluge Open
9	Deluge Closed
10	Low Pressure
11	Normal Pressure
12	Manual Stop Button
13	Manual Stop Released
14	Remote Start Run
15	Remote Start Term
16	Pressure Fail
17	Pressure in Range
18	Pressure Log
19	Pressure Log Run
20	System Reset
21	Low Suction Pressure
22	Suction Pressure Clear
23	Pump Room Trouble
24	Pump Room Normal
25	Weekly Test Running
26	Weekly Test Done
27	Parameters Reset
28	Passwords Reset
29	Flow Meter On
30	Flow Meter Clear
31	Fuel Spill Input
32	Fuel Spill Clear
33	Engine Over Speed
34	Engine Over Speed Clear
35	Engine Temp High
36	Engine Temp High OK
37	Oil Pressure Low
38	Oil Pressure Low OK

ID	Event Message
39	Fuel Level Low
40	Fuel Level Low OK
41	Fuel Level High
42	Fuel Level High OK
43	Low Pump Room Temp
44	Pump Room Temp OK
45	Reservoir High
46	Reservoir High Clear
47	Reservoir Low
48	Reservoir Low Clear
49	Relief Valve Open
50	Relief Valve Closed
51	Charger 1 Fail
52	Charger 1 Recovered
53	Charger 2 Fail
54	Charger 2 Recovered
55	Battery 1 Trouble
56	Battery 1 Clear
57	Battery 2 Trouble
58	Battery 2 Clear
59	Crank 1 Button
60	Crank 1 Button Clear
61	Crank 2 Button
62	Crank 2 Button Clear
63	Calibration Error
64	Calibration Error Cleared
65	No Control Voltage
66	Control Voltage OK
67	Missing Battery
68	Missing Battery OK
69	AC Power Lost
70	AC Power Restored
71	Test In Progress
72	Test Completed
73	Automatic Start
74	Automatic Start Clear
75	Low Suction Level
76	Suction Level OK
77	Main Switch Off
78	Main Switch Auto
79	Main Switch Manual
80	Jockey Pump Running

ID	Event Message
81	Jockey Pump Off
82	Jockey Pump Trouble
83	Jockey Pump OK
84	Battery 1 Out
85	Battery 1 Out Off
86	Battery 2 Out
87	Battery 2 Out Off
88	Charger 1 Out
89	Charger 1 Out Off
90	Charger 2 Out
91	Charger 2 Out Off
92	Weekly Test Due
93	Weekly Test Due Clear
94	System Overpressure
95	System Pressure OK
96	Fuel Injector Fail
97	Fuel Injector OK
98	Coil Continuity 1 Fail
99	Coil Continuity 2 Fail
100	AC Power Loss Start
101	AC Voltage High
102	AC Voltage Normal
103	AC Voltage Low
104	AC Power Loss Delay
105	Fuel Valve Relay Status
106	Low Pressure Sensor
107	Auto Start Input
108	Auto Start Input Off
109	Pressure Delta
110	Cranking 1
111	Cranking 2
112	Mode Off Off
113	Mode Auto Off
114	Mode Manual Off
115	Jockey Pump Running
116	Jockey Pump Off
117	Jockey Pump Trouble
118	Jockey Pump OK
119	Battery 1 Out
120	Battery 1 Out Off
121	Battery 2 Out
122	Battery 2 Out Off

ID	Event Message
123	Charger 1 Out
124	Charger 1 Out Off
125	Charger 2 Out
126	Charger 2 Out Off
127	Weekly Test Due
128	Weekly Test Due Clear
129	System Overpressure
130	System Pressure OK
131	Fuel Injector Fail
132	Fuel Injector OK
133	Primary Fail Start
134	Primary Fail Clear
135	Primary Interrupt
136	Primary Interrupt Cleared
137	Coil Continuity 1 Fail
138	Coil Continuity 2 Fail
139	AC Power Loss Start
140	AC Voltage High
141	AC Voltage Normal
142	AC Voltage Low
143	Secondary Crank
144	Secondary Crank Off
145	AC Power Loss Delay
146	Fuel Valve Relay Status
147	Low Pressure Sensor
148	Auto Start Input
149	Auto Start Input Off
150	Pressure Delta
151	Cranking 1
152	Cranking 2
153	Test Button
154	Test Failed
155	Test Override
156	Auto Shutdown Disabled
157	Auto Shutdown Enabled
158	Duty Pump
159	Standby Pump
160	Unit Available
161	Unit Not Available
162	Dump Valve On
163	Dump Valve Off
164	Shutdown Activated

ID	Event Message
165	Shutdown Released
166	Manual Test Input
167	Manual Test Clear
168	Term 301, ECMS
169	Term 301, ECMS Clear
170	Term 302, FIM
171	Term 302, FIM Clear
172	Term 303, ECMW
173	Term 303, ECMW Clear
174	Term 304, ECMF
175	Term 304, ECMF Clear
176	Term 305, LSP
177	Term 305, LSP Clear
178	Term 310, HRT
179	Term 310, HRT Clear
180	Term 311, LRF
181	Term 311, LRF Clear
182	Term 312, LET
183	Term 312, LET Clear
184	Pump Trouble Group
185	System Trouble
~~184~~ 186 –250	Undefined

Table C.9.2.10.1(j) Jockey Event Messages

ID	Event Message
1	Pump Running
2	Pump Stopped
3	Fail to Start
4	Fail to Start Noted
5	Call to Start
6	Phase Failure
7	Phase Reversal
8	Motor Overload
9	Motor Normal
10	Low Pressure
11	Normal Pressure
12	Pressure Fail
13	Pressure in Range
14	Pressure Log
15	Pressure Log Run
16	System Reset
17	Parameters Reset
18	Passwords Reset

ID	Event Message
19	Automatic Start
20	Automatic Start Clear
21	Main Switch Off
22	Main Switch Auto
23	Main Switch Manual
24	System Overpressure
25	System Pressure OK
26	Auto Start Input Off
27	Pressure Delta
28	Mode Off Off
29	Mode Auto Off
30	Mode Manual Off
31–250	Undefined

Table C.9.2.10.1(k) Performance Data (Modbus Registers 42501–42920)

-	Address Offset	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
-	Data Description	Year	Mo	Day	Hr	Min	Sec	Flow Point	Measured Flow	System Pressure	Suction Pressure
	Starting Address	-	-								
Present Data Table	42501	42501						0			
	42521	42521						25			
	42541	42541						50			
	42561	42561						75			
	42581	42581						100			
	42601	42601						125			
	42621	42621						150			
Previous Data Table	42641	42641						0			
	42661	42661						25			
	42681	42681						50			
	42701	42701						75			
	42721	42721						100			
	42741	42741						125			
	42761	42761						150			
Acceptance Data Table	42781	42781						0			
	42801	42801						25			
	42821	42821						50			
	42841	42841						75			
	42861	42861						100			

-	Address Offset	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
	Data Description	Year	Mo	Day	Hr	Min	Sec	Flow Point	Measured Flow	System Pressure	Suction Pressure
	Starting Address	-	-								
	42881	42881						125			
	42901	42901						150			

Notes:

(1) The controller should be arranged to record and store the data for a given flow point when so initiated by the operator.

(2) Data are organized into tables of 7 records containing 18 fields with date and time as the key field. Date and time fields are organized per ISO.

Table C.9.2.10.1(l) Pump Curve Parameters

Offset	Data Description	Range	Units	Write	Scale
+0	Year	1700–3000	yr	RO	
+1	Month	1–12	mo	RO	
+2	Day	1–31	day	RO	
+3	Hour	0–23	hr	RO	
+4	Minute	0–59	min	RO	
+5	Second	0–59	sec	RO	
+6	Percent flow point	0–150	%	RO	
+7	Measured flow	0–50,000	gpm/L/min	RO	
+8	Suction pressure	0–6000	psi/bar/kPa	RO	0.1·Raw
+9	Sys–suc pressure*	0–6000	psi/bar/kPa	RO	0.1·Raw
+10	System pressure	0–6000	psi/bar/kPa	RO	0.1·Raw
+11	RPM	0–5000	rpm	RO	
+12	Amps L1	0–60,000	A	RO	0.1·Raw
+13	Amps L2	0–60,000	A	RO	0.1·Raw
+14	Amps L3	0–60,000	A	RO	0.1·Raw
+15	Volts L1–L2	0–50,000	V	RO	0.1·Raw
+16	Volts L2–L3	0–50,000	V	RO	0.1·Raw
+17	Volts L3–L1	0–50,000	V	RO	0.1·Raw
+18	Table units		0 = psi, 1 = bar, 2 = kPa	RO	
+19	Table units		0 = gpm, 1 = L/min	RO	

*Net pressure calculation.

Table C.9.2.10.1(m) Diesel Engines and Other Pump Room Devices

Modbus Register (43001–43999)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
		Pump Room Device					

Modbus Register (43001–43999)	Bit	Description	Units	Optional (X)	Write	Range (See Note 1)	Scaling and Notes
43001		Pump room device ID			RO		See Note 2
43002–43010		Undefined			RO		
43011–43020		Manufacturer name			RO	ASCII Text	20 characters
43021–43030		Basic model			RO	ASCII Text	20 characters
43031–43040		Equipment type			RO	ASCII Text	20 characters
43041–43050		Serial number			RO	ASCII Text	20 characters
43051–43060		Software version			RO	ASCII Text	20 characters
		Time and Date Stamp					
43061–43064		Date and time	milliseconds		RO	64-bit binary number	See Note 3
43065–43070		Undefined			RO		
		Diesel Engine Data					
43071		Pressure units			RO	0 = psi, 1 = bar, 2 = kPa	
43072		Temperature units			RO	0 = °F, 1 = °C	
43073–43080		Undefined					
43081		Engine coolant temperature	°F/°C		RO	0–300	
43082		Engine oil pressure	psi/bar/kPa		RO	0–150	
43083		Engine speed	rpm		RO	0–4000	
43084		Total engine hours	hr		RO	0–59999	
43085–43100		Undefined					
43101–43199		Manufacturer specific				100 registers	
43200–43999		Undefined					

Notes:

(1) A register value of FFFFH indicates data are not available.

(2) See Figure C.9.2.10.1 for an example of pump room device identification.

(3) Date and time stamp uses 64-bit Unix time stamp (Epoch) per ISO 8601, *Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times*. For example, 2017-09-12T14:00:00.0001 is a date and time stamp.

Supplemental Information

File Name	Description	Approved
20-_SR-35_for_PC_47_Annex_C.docx	Updated Tables. For staff use.	

Submitter Information Verification

Committee: FIM-AAA

Submittal Date: Tue Oct 27 10:08:13 EDT 2020

Committee Statement

Committee Statement: Following changes have been added to the table in order to further clarify signaling requirements

1) A pump trouble group alarm to the electric fire pump controller table to match the diesel fire pump controller table

2) A system trouble alarm is added to both tables as they are required for both fire pump controllers

3) The weekly test time setting is added as it was missing from both tables

4) A clarification in the pump last run time in both tables to change from minutes to hours and seconds to minutes in order to fully capture a long pump run.

5) Updates to message tables to reflect new Pump Trouble Group and System Trouble alarms

Response Message: SR-35-NFPA 20-2020

Public Comment No. 47-NFPA 20-2020 [Section No. C.9.2.10.1]